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The President's Message

THE pending shipping legislation has been considered of enough importance to the general welfare of the country to warrant calling Congress together in extraordinary session and the President, himself, has delivered a special message to that body outlining our shipping position as a problem of "grim actuality." As the President said, "We are facing insistent conditions, out of which will come either additional and staggering Government losses and national impotence on the seas, or else the unfurling of the flag on a great American merchant marine commensurable with our commercial importance to serve as a carrier of our cargoes in peace and to meet the necessities of our defense in war."

Although written in stirring language, this is indeed a practical statement and the whole message, in fact, is presented in a plain yet forceful way which should appeal more to our business faculties than to our sentimental aspirations. "Our immediate problem," declared the President, "is not to build and support a merchant marine, which I hold to be one of the highest and most worthy aspirations of any great people: our problem is to deal with what we now possess. Our problem is to relieve the public treasury of the drain it is already meeting."

Passing over the wartime cost of over $3,000,000,000 that we spent on these ships, the lives and treasure that were lost because of our impotency on the sea and the average monthly deficit of $16,000,000 that the Government suffered until the Shipping Board secured experienced operators, the President pointed out that the merchant marine, two-thirds of which is idle, still costs us $50,000,000 a year. "It is not, therefore, a question of adding new treasury burdens to maintain our shipping," he declared. "We are paying these burdens now. It is not a question of contracting an outlay to support our merchant shipping, because we are paying already. I am not asking your authorization of a new and added draft on the public treasury. I am appealing for a program to diminish the burden we are already bearing."

And the worst of it is that this annual expenditure of $50,000,000 is not getting us anywhere. On the contrary, it is an effective barrier against a permanent merchant marine under private ownership, for capital does not dare to enter into competition with Government-owned ships which, if the fixed charges, such as interest, depreciation and insurance, are taken into consideration, are costing us much more than fifty million dollars a year.

Depreciation, however, is constantly at work and it is this factor that makes it imperative to transfer the fleet to private ownership at the earliest possible moment. Many vessels are worthless now; all are deteriorating and under present conditions it is only a question of how long before it will be necessary for the United States, which 70 years ago had a merchant marine that was second to none, to acknowledge to the world that we cannot operate on the seas.

The President indicated three possible courses of action as follows:

"The first is constructive—enact the pending bill, under which I firmly believe an American merchant marine, privately owned and privately operated, but serving all the people and always available to the Government in any emergency, may be established and maintained. The second is obstructive—continue Government operation and attending Government losses and discourage private enterprise by Government competition, under which losses are met by the public treasury, and witness the continued loss and deterioration until the colossal failure ends in sheer exhaustion. The third is destructive—involved the sacrifice of our ships abroad or the scrapping of them at home, the surrender of our aspirations, and the confession of our impotence to the world in general, and our humiliation before the competing world in particular."

A choice among the three must be made and the President believes that the people demand the constructive alternative and that Congress will no longer sustain a program of ob-

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struction. Subsidy, to many, is an offensive term, but the Government has aided other industries and the establishment of a merchant marine will be a means of benefiting the whole country. "If Government aid is a fair term," he said, "—and I think it is—to apply to authorizations aggregating $75,000,000 to promote good roads for market highways, it is equally fit to be applied to the establishment and maintenance of American market highways on the salted seas. If 'Government aid' is the proper designation for forty to fifty millions annually expended to improve and maintain inland waterways in aid of commerce, it is a proper designation for a needed assistance to establish and maintain ocean highways where there is actual commerce to be carried."

The fact remains that if it is called a subsidy then the fifty millions that we are now expending annually is also a

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An Insistent Call

—McCay in the *New York American*

subsidy. Under the pending legislation this expenditure would be cut approximately in half and there would be every opportunity to establish a merchant marine. No one can take advantage of the Government under the proposed bill because it provides that after 10 percent has been realized on the actual investment as determined by Government audit one half of all profits above that figure must be returned to the Treasury until the full subsidy has been returned. It is believed that when American genius has had an opportunity to establish itself in this business success will attend and that the outlay will be returned.

Other nations are naturally concerned about our shipping policy and it may be safely said that all maritime countries are opposed to this shipping measure. As Commissioner Plummer recently said, "It is under the best apple tree that you will find the most clubs," and considering that every ton of shipping that we put into commission is bound to displace a ton of foreign shipping, it is no wonder that other nations are concerned. Foreign shipping countries have a right to feel as they do, but what can be said of Americans upon whom the costly lessons of the great war have made no impression and who oppose an Act upon which the very life of the nation may depend.

There are still far too many who declare that in spite of the records of the last sixty years shipping can get along without Government assistance. They should heed the President's statement, that the head of a steamship company operating a fleet of ships had recently called at the executive offices to ask permission to transfer his vessels to a foreign flag. The reason given was that he could reduce his labor costs alone sufficient to provide a profit on the capital invested. Congress has also made shipping laws, to say nothing of applying prohibition to American ships, that are in need of immediate revision. To quote Chairman Lasker, our Attorney General Daugherty has outdone Moses as a law giver for the best that Moses could do was to make the Red Sea dry.

The proper American viewpoint according to the President is "from which one sees American carriers at sea, the dependence of American reliance in the event of war. Some of the costly lessons of war must be learned again and again. But our shipping lesson in the world war was much too costly to be effaced from this or the future generations.

"When people fail in the national viewpoint and live in the confines of community selfishness or narrowness, the sun of this republic will have passed its meridian, and our larger aspirations will shiver in the approaching twilight.

"But let us momentarily put aside the aspiring and inspiring viewpoint. The blunt indisputable fact of the loss of fifty million a year under Government operation remains; likewise the fast diminishing capital account, the enormous war expenditure to which we were forced because we had not fittingly encouraged and builded as our commerce expanded in peace. Here are the facts to deal with; not fancies wrought out of our political and economic disputes. The abolishment of the annual loss and the best salvage of the capital account are of concern to all the people.

"It is my firm belief that the combined savings of operations, losses and the protection of the capital account through more advantageous sales of our war-built and war-seized ships, because of the favorable policy which the pending bill will establish, will more than pay every dollar in Government aid for 25 years."

The New York *Tribune* calls the President's message "An Unanswerable Plea." It says, "Mr. Harding was at his clearest and best in his plea for the shipping bill. That fairness which is one of his most admirable qualities spoke throughout his argument. He presented the unquestioned facts of the situation and set forth the only possible courses of action. In reaching a decision he urged Congress to forget groups and parties and to solve the problem with an eye single to the welfare of the whole country."

Indeed, the President has made a plea that cannot be answered just the same as he has given us a plan to establish a merchant marine for which the opponents of the proposed shipping legislation can suggest no alternative. This plan is based on the facts and findings of the most expert maritime committees that could be gotten together. They were com-

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posed of both Democrats and Republicans but no question of partisanship entered into their work. The House Committee on Merchant Marine and Fisheries has favorably reported and endorsed the subsidy bill. The President has spoken and now Congress, sitting in extraordinary session, must decide whether our trade will follow our flag to every port in the world or whether it will take such consideration as our maritime rivals feel disposed to give it.

Standardization

TOO much stress cannot be given to the importance of the informal conference on the subject of standardizing shipbuilding and ship operating practices and equipment held at the Grand Central Palace, New York, during "American Marine Week." From the discussion it was clear that only a well-defined plan of procedure is necessary to insure the co-operation of every organization in the marine field.

The next step, that of conforming with the resolution directing the formation of a committee on plan and scope and ways and means, should be taken with the least possible delay; but great care should be used in selecting the personnel that each phase of shipbuilding and ship operation be represented by men well qualified to act and that the Army, Navy and Shipping Board be included. The fact that the Department of Commerce, which was responsible for bringing about the conference, has pledged its support will go a long way toward insuring success to the movement.

The Star of Phœnicia

"BY night the richly freighted ships of the Phœnicians, skilled commanders of the commerce of the Ancient World, were guided into all the then known ports of men by the North Star.

"More than 3,000 years ago, the emulating Greeks, discovering the valued commercial purposes to which it was being put by these far famed builders of Tyre and Sidon, called it the 'Star of Phœnicia.'"

With this introduction, Mr. Edward A. Biggs, general counsel and vice-president of the Foreign Trade Division, Mississippi Valley Association, has written a brief outline of the history of world commerce entitled "The Star of Phœnicia." In this work he has proved, if the past is any criterion upon which the future may be known, that no country may expect to retain its place among the leaders of nations unless it develops and retains a profitable foreign trade.

It must be noted, however, that although Phœnicia, Greece, Carthage and even Germany acquired wealth and strength through foreign trade, this very trade has been the direct and indirect causes of the wars which resulted in their downfall. But America, unlike the countries of the Old World, is not open to the invasion of armies except they be transported over the sea. So our problem for insuring our safety and prosperity is simple in comparison. If we decide to go after the proportion of world commerce that we are really entitled to, that trade can be amply protected by an adequate merchant marine, that will guarantee safe and regular deliveries, and by a Navy second to that of no other country.

Mr. Biggs points out that "the Mississippi Valley is the granary of this nation as the valley of the Nile was the granary of Rome." It may be added that the surplus products of the manufacturing industry as well as agriculture in that section of the country amount to billions of dollars annually (foreign exports from the Mississippi Valley in 1920 amounted to $5,543,000,000). It ought therefore to be evident, if foreign trade is developed to take care of capacity production in the Middle West, that even if American ships carried every ton of exports and imports from one section of the seaboard, the Mississippi Valley would be the far larger gainer than the seaports through which their business flowed. And with the development of the internal waterways which this section of the country, having a majority representation in Congress, is bound to demand and obtain, and with the migration of seaboard industries which are now a thousand or more miles away from their raw products to the Middle West, which has been freely prophesied, the statesmen of the Valley would be blind indeed to their own interests if they allowed an annual expenditure of a few million dollars to stand in the way of an American merchant marine, the only vehicle that can guarantee the delivery of their products.

That they will not be so foolish is plainly shown by the passage of three Acts in the past few years which are solely designed to build up foreign trade. We refer to the Webb-Pomerene Act which provides that combinations for export trade which could not be formed under the Sherman Anti-Trust and Clayton Laws may engage in the export trade. Second, the Edge Law which provides the means of financing foreign trade. Third, the Merchant Marine Act of 1920 in which the country went on record as favoring any action that might be necessary to provide an adequate merchant marine.

Furthermore, as Mr. Biggs says, every man, woman and child in the United States is financially interested in our Government-owned merchant marine to the tune of $40 per capita. It is barely possible that through antipathy they might allow a fleet, that it cost $4,000,000,000 to construct, to be scrapped if it meant only the ships. But if these vessels are scrapped, it means that the machinery, equipment, etc., in other words the billions of dollars that we have put into added capacity for production for foreign consumption since 1914, must also be scrapped.

Annual Index Will Be Supplied on Request

THE annual index of MARINE ENGINEERING AND SHIPPING AGE will be published separately from the magazine at the end of the year. As the annual index will be useful only to those subscribers who have kept a complete file of the magazine for the year, only a sufficient number of copies will be printed to fill the orders received for it at this office on or before January 1. A copy of the index will be mailed without cost to each subscriber whose order for it is received on or before that date.

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If the Shipping Bill Fails—What Then?

The Life of an Industry That We Must Depend Upon for Prosperity in Peace and Safety in War Is at Stake

By "Old Scotch"

EVERY good general before going into a fight makes plans for the possibility of a retreat. It makes no difference how confident he may be of victory, he always plans for contingencies which may arise despite his confidence and his well worked out problem of how to succeed. The better general he is, the more he thinks of what might happen if everything goes wrong. This looking ahead does not detract in the least from his chances of winning.

The advocates of the so-called subsidy bill are just now in the position where they should look ahead, and consider what would happen if the bill should fail. It will not hurt the chances of its passage, but on the contrary it may do some good, if we consider what we will then be facing, and consider it in such a way that we look the situation squarely in the face, and do not deceive ourselves regarding the cold facts which may then confront us.

The record of the past is the best harbinger of the future. If this proposed legislation should fail, we would be no better off now so far as governmental assistance is concerned than we were in the pre-war years, when our total merchant marine engaged in the foreign trade had dwindled to six or eight combined freight and passenger ships. As a matter of fact we will be worse off, because at that time world trade was in normal condition, with no cogs missing from the great wheel of producing commercial nations. If in pre-war years we could only keep these six or eight vessels going, what can be expected now when the ocean carrying trade is "shot to pieces" by the greatest period of depression on the seas the modern world has yet encountered?

Our Overseas Shipping

By means of the appropriation of fifty millions of dollars annually the Shipping Board has some four hundred vessels in operation in the foreign trade, which are carrying about one-third of our total exports and imports. They are extending our trade on various routes, protecting our shippers and importers from excessive carrying charges to the world's competitive markets, and incidentally keeping considerable money in circulation in the American repair yards, giving employment to a very respectable number of American officers and seamen, and helping other industries which are closely allied to ship operation. If the pending bill is not passed so that these ships can be placed in the hands of private owners, how long will this kind of government operation be kept up at a sure loss to the government?

With the axe of retrenchment being lustily wielded by the members of our national legislature, spurred on in their efforts as they are, by a tax burdened public, is it probable that such appropriations will be much longer continued for the operation of the government owned fleet?

Failure of Shipping Bill Means Government Ownership

If they are continued, the die will then be cast for the much dreaded government ownership and operation of transportation facilities on the sea. While such a procedure will be better than having no merchant marine at all, it must ultimately be doomed to failure, as many similar attempts are and have been in the world's history.

So long as the preclusion of foreign shipping from our coastwise trade is continued, we may be reasonably assured of a small merchant marine, but one that will be totally inadequate to prevent rate discriminations in our foreign trade, and to provide the absolutely essential merchant ship tonnage for our national defense. When we were drawn into the recent World War, it was pitiable to behold our helplessness for furnishing anything like the tonnage we needed for troop and supply transport to the European battlefields. Fortunately for us our allies were as deeply concerned as ourselves in getting our troops and munitions to the other side, and quite readily furnished us their ships, for which we paid and paid dearly. The bills for hiring foreign vessels for only a period of six months at the height of the war would have paid for the entire amount of the proposed subsidy to our own ships. Oh! if we could but remember some of our bitter experiences during that period of strife and learn some lessons from them. We never again should hypnotize ourselves into the belief that our coastwise tonnage would supply our needs for merchant shipping when we are faced with the inexorable demands of war.

What Would Become of Our Shipyards?

Let us look at our shipbuilding facilities in case this subsidy bill should fail. Even in these days of depression we still have a sufficient number of shipyards in operation to supply our needs for both commerce and national defense. The paltry contracts they now have in hand have been taken at ruinous rates, with the almost despairing desire of keeping their organizations together. All thoughts of earning overhead expenses and making any profits whatever have been abandoned at the present time. Hope of the passage of the subsidy bill is the only incentive the shipyards have for holding on.

In pre-war years there was sufficient naval work for the Government, handed out at ofttimes ruinous competition to keep a half dozen first-class shipyards busy, in combination with such small orders as they received for coastwise and harbor craft. The naval holiday has removed this sustaining part of their business for at least the next ten years.

Any one at all familiar with American shipyards, must and does know, that two such yards as the Newport News and New York Shipbuilding Company's plants could easily supply all the demands for new coastwise and harbor craft, working each at two-thirds capacity. What would become of the other yards now struggling to keep their heads above water? What would become of the thousands of skilled mechanics, and trained technical staffs connected with our shipyards, if they must depend on the meager amount of work necessary to keep up our coastwise and harbor craft demands for replacements?

Future of Our Repair Yards in the Balance

We have built up one of the most efficient systems of repair plants in this country, during the past five years, that can be found anywhere on the globe. If this subsidy bill fails, and we have no ships of our own in the foreign trade, what will become of them? It is true that shipping will always be coming to our ports, but foreign ships will never repair in American yards on account of the higher costs, due to our higher rates of wages. Such emergency repairs as foreign ships would have to make in American ports, in order that they may resume their voyages to home ports,

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would not support one-tenth of the number of men now actually employed in American repair plants.

These repair plants are located everywhere that ships congregate and, unlike shipbuilding plants, are not confined to localities dictated by economic conditions. Thus we have important repair plants at Boston, New York, Philadelphia, Camden, Wilmington, Baltimore, Norfolk, Newport News, Charleston, Savannah, Tampa, Mobile, New Orleans, Galveston, Los Angeles, San Francisco, Portland and Seattle. Let the senators and congressmen representing states containing these shipbuilding and repair plants take heed that, if this vitally necessary legislation fails of enactment, their own communities will be very much affected, when the United States fails to maintain ships of its own in our foreign trade.

The ramifications of shipbuilding and ship repairs are so embracing that but few, if any, of our states will not be affected by the decline of this industry. Iron, steel, copper, lead, zinc, lumber of all kinds, cotton fabrics, rubber, hemp, cordage, coal, oil, paints, hardware, crockery and hundreds of other items enter into the construction and repair of ships. The thousands of mechanics employed must be clothed and fed, so that the raisers of cattle and food products of all kinds throughout the land are also very vitally interested.

The failure to pass this subsidy measure at this time means the practical destruction of shipbuilding and ship repairing in this country for the reasons hereinbefore pointed out. It has been a basic industry ever since the foundation of the country. Never before in our history has its very existence been so alarmingly threatened as it is at the present time, due to the peculiar conditions thrust upon us as an aftermath of the great war. No other industry is so important for our national safety in peace and war as is the art of shipbuilding. We cannot build ships when the art has been lost, nor can we buy them from abroad when war is threatened or at hand. Dives in the torments of the Inferno could place no greater value on water, than we would place on ships after, by our own negligence, we had lost the facilities to build them. The period when we allow our shipyards to close, for want of support, will mark our decadence as a virile nation.

The writer is firmly convinced that this session of Congress will see the enactment of the pending subsidy bill, as he has faith in the common sense of Congress, but it does no harm to consider, as has been briefly done herein, the dire results of its failure.

Maritime History Made at Brussels Conference

World-Wide Acceptance of Uniform Rules That Have Been Dominating Issues of Maritime Law Practically Certain

IT is a pleasure to be in position to present our readers with the first official information to reach the United States as to the results of the history-making conferences on the unification of maritime law held at London and Brussels in October. The protocol is in French and was not received by Washington for translation before the first of December. The importance of the deliberations may be judged from the fact that twenty-four nations were represented at the Brussels Diplomatic Conference, and that agreed conclusions were reached on three of the four subjects discussed, and an initial agreement on the fourth. All that now remains in order to secure a world-wide uniform acceptance of the dominating issues of maritime law is for the several Governments to endorse the findings of the Conference—an eventuality that is practically certain.

The Brussels Conference, which was the final and conclusive one, was held on October 17-26, with fifty delegates present. The subjects before it were:

(1) Limitation of Shipowners' Liability.
(2) Maritime Mortgages and Liens.
(3) Contracts of Carriage by Bills of Lading.
(4) Immunity of State-owned Ships.

The agreements were as follows:

LIMITATIONS OF SHIPOWNERS' LIABILITY

Instead of freight and accessories as the measure of liability added to the value of the ship, with the consequent difficulty of investigation and the chances of litigation, the solution arrived at is ten percent of the value of the ship *at the commencement of the voyage*. This ten percent will include some accessories. Thus the freight of the tramp is put on the same proportionate plane as that of the liner. In case of loss of life, the personal liability on the part of the shipowner will be £8 per ton; thus the total measure of liability is fixed at the value of the ship plus ten percent with the provision that in event of loss of life there shall be a separate fund up to £8 per ton for claims in respect of loss of life or personal injuries. This would give life claims in the United States important rights they have never enjoyed, and cargo claims will only be limited by the occasion instead of by the voyage.

MARITIME MORTGAGES AND LIENS

The only liens having priority over a mortgage are: (1) law costs, taxes, port dues, etc.; (2) wages; (3) salvage; and (4) collision and negligence claims. Masters' disbursements and bills of lading claims are both postponed to the mortgage. In order to prevent injustice to the postponed lien creditor an article was added that notice of the mortgage should be inserted by the official responsible on the ship's papers; and conversely a provision was inserted that in regard to liens for masters' disbursements and bills of lading, claims should only take precedence of the subsequent mortgage, if notice of the lien be given to the registrar of mortgages within three months.

CONTRACTS OF CARRIAGE BY BILLS OF LADING

This is the new title for what has been familiarly known as "The Hague Rules." They have been so frequently discussed in MARINE ENGINEERING AND SHIPPING AGE as to be generally understood in the form in which they came up before the Brussels Conference. That form passed practically unaltered, with two important exceptions. Article III, Rule 6, limits the time to one year instead of two, after delivery of goods or the date when goods should have been delivered, in which the carrier and the ship shall be discharged from all liability in respect of loss or damage unless suit has been brought. The limitations thus prescribed shall not be applicable, if the condition of the merchandise has been contradictorily agreed upon at the time of its receipt. Notice of loss or damage may be given at the port of discharge to the carrier or his agent at the time of the removal of the goods into the custody of the person entitled to delivery, if such loss or damage is apparent; if loss or damage be not apparent at the time of delivery, three days extra are allowed for notice. The phrase "prima facie," so familiar to Anglo-Saxon legal procedure, was vigorously opposed by

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the French delegates, and in its stead was employed a more verbose expression which means exactly the same thing.

Article IV, Rule 4, which has to do with deviations, was completely changed. It was finally agreed upon in the following terms: Any deviation in saving or attempting to save life or property at sea, or any reasonable deviation shall not be deemed to be a breach of this convention or of the contract of carriage, and the carrier shall not be liable for any loss or damage resulting therefrom.

IMMUNITY OF STATE-OWNED SHIPS

This is the subject upon which complete agreement could not be obtained at the moment, because, although a resolution on the subject had been unanimously passed at the London Conference of the Comité Maritime International the week before the Brussels Diplomatic Conference met, time was wanting to bring the matter officially to the notice of the various Governments, and the consequence was that the delegates came to Brussels without the necessary instructions that would permit of their signing. It will, therefore, have to wait upon future action.

However, a substantial basis for action lies in the resolution adopted at the London Conference and which reads as follows:

(1) Sovereign States in regard to ships owned or operated by them and cargoes owned by them and cargoes and passengers carried on such ships ought to accept all liabilities to the same extent as a private owner;

(2) Except in the case of the ships and cargoes mentioned in paragraph 3 such liabilities should be enforceable by the tribunals having jurisdiction over and by the procedure applicable to a privately-owned ship or cargo or the owner thereof;

(3) In the case of:

(a) Ships of war;

(b) Either vessels owned or operated by the Sovereign States and employed only in Government non-commercial work;

(c) State-owned cargo carried only for the purpose of Government non-commercial work on ships owned or operated by the Sovereign State.

Such liabilities should be enforceable by the like tribunals, but only of the State by which the ship is owned or operated, and should be enforceable by action "in person" as against such State, and in addition by any other form of procedure permitted by the law of such State.

The Value of Tramp Steamers to a Merchant Marine*

Wonderful Success of British Marine Is Due to Her Pluck, Vision and Determination in Building and Operating Tramp Steamers Reaching Out to All Ports of World

By C. H. Potter†

THERE exist today four distinctive types of steam vessels; first, the combination passenger, mail and express type; second, the general cargo type, trading between United States and foreign ports maintaining definite sailing schedules; third, the tank type, employed in carrying oil in bulk; and fourth, a type known in the shipping trade as the "tramp." The tramp type differs from the cargo liner in that it does not maintain regular sailing dates. Its function is principally to carry bulk cargoes such as coal, ore, grain, lumber, phosphate rock, sulphur, etc. It serves as a medium for relieving freight congestions, and in the past has been the medium whereby many regular berth operations have been established and maintained.

For years prior to the war in 1914 we had no merchant marine employed in foreign trade that was worthy of being called a merchant marine. A few lines were fighting for their very existence under the American flag running between American and foreign ports, but it was hopeless without adequate financial assistance from our Government as an offset against the low operating and capital costs of the competing foreigner. True, we had and still have a splendid coastwise fleet, but I am discussing at this time foreign trade.

For years, statesmen and others who were in close touch with foreign and domestic affairs warned us that a merchant marine was essential to our very being; that our shipyards should be built up; that no nation could continue to be great that did not possess and maintain a real merchant marine, and yet in the face of these repeated warnings we drifted along, doing nothing that was constructive. Congress enacted laws that put added burdens on shipping, increased the cost of operation, destroyed initiative and made it difficult to induce capital to tie up with the shipping industry.

*Address delivered at Marine Exposition, New York, November 11, 1922.
†President, Maritime Association of the Port of New York.

GOVERNMENT POLICY HAS CHANGED

To further illustrate and emphasize the weakness of our merchant marine prior to the war, you will recall when President Roosevelt ordered our fleet of battleships around the world it was necessary to employ foreign steamers to carry coal and other supplies for the fleet. This concrete example of our weakness should have inspired us as a nation to support a merchant marine, but we drifted along, little realizing that a day of reckoning was ahead. Again, it was no unusual occurrence for the Navy Department to charter foreign flag steamers to carry coal to the various naval stations in the Pacific, to Cuba and the Panama Canal, for the reason that the foreign steamer carried it cheaper than the American. Surely this was a destructive rather than a constructive method of building up a merchant marine. Happily, however, the Government's attitude has changed, and I am glad to state that it is doing everything possible to employ and encourage its merchant marine.

Possibly we can profit by reviewing what other successful maritime nations have accomplished in the building and developing of their tramp steamer tonnage. England, for instance, is a living example.

The wonderful success of the British marine is due to her pluck, vision and determination in building and operating tramp steamers reaching out to all parts of the world, opening up trading posts, establishing and maintaining other avenues of communication. Not only do they carry merchandise to and from British and Colonial ports, but to and from ports of other nations, our own included. And what is true of England is true of other foreign nations,

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especially Norway and Japan. They have made wonderful progress. England's tramp tonnage, I am told, represents 60 percent of its total merchant fleet.

During the war we constructed some fourteen hundred steel steamers—a great and mighty fleet of various types built in American shipyards by American citizens. The bulk of these steamers are at present tied up in our various seaports. Many of these steamers are suitable and available for tramp service, dependent, of course, upon their ability to operate as cheaply as foreigners, which at present cannot be done for the very good reason that the capital cost and our standard of wages and living will not permit it.

WIDELY DISTRIBUTED OWNERSHIP DESIRABLE

Another factor which has contributed toward the development and success of foreign tramp tonnage is due to the distribution of ownership among the masses rather than among a few corporations. The effect of this distribution of ownership tends to create interest and enthusiasm for the merchant marines of their respective countries.

Congress has appropriated vast sums of money to carry out the provisions of the Jones Bill; through the Shipping Board it has encouraged and developed the passenger liner and cargo liner, and rightly so—but tramp operation has received no support nor encouragement. Figures which I have in my possession substantiate this statement. Since January 1, 1922, there cleared from our United States ports one thousand and three foreign tramp steamers with bulk cargoes and only two hundred and twenty privately owned American steamers with bulk cargoes.

Senator Wesley L. Jones, in giving his views in regard to the tramp steamer, states "that, while the Merchant Marine Act of 1920 does not specifically refer to this particular type of vessel, it should be taken for granted that tramp steamers would be one of the main parts of any adequate merchant marine, and notwithstanding that the Shipping Board is directed in respect to shipping routes and steamship lines, there is no warrant for the board's concluding that tramp steamers are not an integral part of an adequate merchant marine."

Therefore, it is fair to assume that it was not in the minds of the framers of the Jones Bill that private companies could operate and compete with foreign steamers without receiving financial assistance in some form from the Government. Comparative figures disclose that it costs 25 to 30 percent more to operate an American tramp steamer than it costs a foreign steamer of like tonnage. This fact alone should be convincing proof that a subsidy is necessary for the development and maintenance of our merchant marine.

SAME PRINCIPLE APPLIES TO FOREIGN AS TO COASTWISE TRADE

I hear some say, why worry about it? If foreign steamers will carry our imports and exports cheaper than American steamers, let them carry it. Then, why not go further and apply that same principle to our coastwise trade? For example, take one particular branch of our coastwise trade—I refer to our intercoastal trade. Today we have about 80 of the finest cargo steamers afloat averaging ten thousand deadweight tons, carrying general cargoes between Atlantic and Pacific coast ports via the Panama Canal, giving employment to a large number of officers and men. Again, why not continue to have foreign colliers and supply vessels trail our battleships and carry coal and oil to our naval stations? That has been done, and in peace times. Put these questions to our citizens and I venture their reply would be almost unanimous in favor of protecting our coastwise trade and against employing foreign ships to carry coal and other supplies to our naval stations. This service should be performed by our tramp steamers.

The point I wish to emphasize is that this protection to our coastwise fleet is in reality a form of subsidy—transportation of Naval coal and supplies in American vessels costs more than a like service in foreign bottoms and therefore takes the form of a subsidy.

It is gratifying that the present proposed subsidy bill provides for compensation to the tramp type of steamer—and to my mind the subsidy bill, if enacted, will revolutionize our merchant marine.

SHIPPING AT CRITICAL PERIOD

Without national aid our merchant marine cannot exist. We are at a critical period, and it now rests with Congress as to whether or not we shall have a merchant marine worthy of this great nation.

In case of war we need large fast steamers for scout ships and for carrying troops. We need cargo liners and tramp steamers to carry supplies for the Navy and base supplies—in both instances they are indispensable—and more, in peace times we need all types—passenger and freight, fast and slow—for the proper development of our world trade. We don't ask for it all, and never did, but we have the right and should demand our fair share.

My hope is that Congress will adopt a subsidy bill that will make possible the development of a merchant marine suitable for national defense in case of war, and, in times of peace, to develop and maintain avenues of trade. Also, that Congress will revise our navigation laws insofar as they tend to obstruct and destroy the healthy growth of our merchant marine.

To sum up—the tramp steamer is valuable and essential:

(a) as an auxiliary aid for national defense purposes
(b) as a medium for the development of our Naval Reserve
(c) to transport coal and other supplies to naval stations and naval vessels
(d) as a merchant vessel to transport bulk cargoes
(e) for relief expedition purposes
(f) for relieving freight congestions
(g) as a pioneer for establishing a regular berth service
(h) as a medium to prevent profiteering

With adequate financial Government aid spread over a term of years or until the merchant marine can be stabilized and made self-supporting, plus American genius, initiative and perseverance, unhampered by Government red tape and wastefulness, I make bold a prophesy that we as a nation will witness the dawn of a new era in our shipping industry, and that in due time we shall have builded on the foundation already laid, a permanent merchant marine worthy of this great and glorious nation.

(Photograph by Kadel & Herbert, N. Y.)

Radio and Wireless Room on the Italian Liner Guilio Cesare

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Simplified Practice as a Service to American Shipping

Address Delivered at Informal Conference on Standardization of Shipbuilding Equipment at Marine Exposition, New York, on November 10

By Ray M. Hudson*

YOUR chairman has stated the purpose of this conference. Let me supplement his remarks by saying there is nothing in which I have to offer as Secretary Hoover's representative that suggests government interference, restriction, regulation or control. You all know the Secretary is a firm believer in "less Government in business and more business in Government." Mr. Hoover's major interest in this meeting (made possible through the good offices of Colonel Simmons of the American Marine Association of which he is president) is along the line of waste elimination and it is entirely from that angle that I will present this message from my Chief regarding "Standardization, and its possibilities for greater usefulness to the marine field."

A few weeks ago during a trip along the Philadelphia waterfront, I saw eight warships, and one hundred and twenty destroyers, and other fighting craft tied up in the basin of the League Island Navy Yard. A little farther along, at Hog Island, I saw nearly one hundred and fifty cargo carriers, anchored row upon row. The contrast between that scene and the one I saw at the same place four years ago, is a fit subject for a master in the art of graphic description. But being an engineer, instead of a novelist, or an artist, I could only make inward comment on the great change occurring in so short a time in the economic conditions of our country. Since a similar picture is possible in several of our harbors, the coincident idleness of both those great fleets is—or, at least, should be—a matter of deep concern to every business man in America, for in their present state they represent a huge, economic waste—a waste that is not measured in terms of depreciation and interest on the tremendous investment represented—but instead is measured in the ever-increasing loss of the useful service they might well be performing in the promotion of trade, industry and transportation of these United States! The crudest evaluation of that staggering loss should challenge us all to a degree of concerted action in behalf of the American merchant marine!

This great annual Marine Exposition, which we are privileged to attend, is a splendidly organized piece of publicity, which will accomplish much toward arousing the American public, not only to a better appreciation of the magnitude of the shipping industry, but more than that—to a better understanding of the vital importance of a successful merchant marine as a factor in the future growth and prosperity of America. But with all due credit for this mighty effort, which recognizes that "well-begun is half-done," there is yet a vast amount of work to be done within the industry itself, before the people will believe that the returns on the investment will warrant their cooperation and support!

For example, what opportunity is there within the industry for further refinement of ocean transportation? Are there any avoidable wastes in current construction, operation and maintenance practices? If so, to what extent do they exist, and what would be the effect of their elimination on present costs? Are we now making full use of the best thought and experience within the industry? Is it possible to simplify methods both commercial and engineering beyond their present status and, if so, would the results justify the effort from a dollars and cents standpoint?

Unless the shipping industry is totally unlike our many other industries, there is in it, as in the others, a real need for rigid self-analysis and a careful determination of all existing uneconomical practices which add cost but which do *not* increase the volume of business done or enhance the quality of the service rendered.

Waste Disclosed in Industries

When Secretary Hoover was president of the American Engineering Council, he directed a survey of waste in industry. Six major industries were carefully studied, and the relative waste, considered in the light of the best practice then existing in the industry, ranged from 28 percent in the metal trades to 64 percent in the men's clothing manufacturing, or say an average of 40 percent of all effort *lost* or spent without a tangible or definite return. As a result of this survey, which might well be called "the Alarm Clock of American Industry," there has developed a widespread community of interest in the general problems of increasing production, securing a more sensible distribution of demand throughout the year, improvement of organization and executive control, and the application of the principle of standardization to products, to materials, to the equipment and also to the performance of the labor by which these are produced!

All of this effort is predicated on the belief that concerted action toward the elimination of waste will lower costs, broaden markets and yet maintain the high standards of American living through providing a fuller measure of this world's goods for the same expenditure we now make.

Purpose of Division of Simplified Practice

The Secretary has organized our Division of Simplified Practice to assist the industries in the solution of their problems of this nature, believing that the facilities, the moral weight and the prestige of the Department of Commerce will facilitate constructive action. It is not our thought, or purpose, to pose as experts in any field; the only experts we know are those we find in the particular field under consideration. Those of you who heard the paper on "Standardization" by Mr. E. H. Riggs, before the Society of Naval Architects and Marine Engineers, had the pleasure of hearing a real expert in the matter. His summary of the standardizations already achieved and practiced within the industry shows both sides of the question in a comprehensive manner. We fully agree with him that the question before us today is *not* one of the intrinsic merits of the principle, but rather a question of the *extent* to which it can be, and will be, applied by you all. In reviewing the membership of the American Marine Association, we find there are many firms who are members of trade associations now carrying on definite simplification programs for the good of the industry they represent. Our Division is participating in the work and can point to simplifications achieved in two major fields—surveys for possible elimination of excessive and unnecessary sizes and varieties going on in sixteen other fields, and contacts with nearly a hundred other industries—that believe that simpli-

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fied practice offers them advantages and benefits well worth obtaining.

WHAT SIMPLIFICATION IS

Now just what is "Simplification"? Let me state it in Secretary Hoover's own words:

"It is certain that there are a great many articles of every day use in which the manufacturer would be glad to undertake some cooperation in standardization, from which the saving in national effort would be interpreted, not into *millions*, but into *billions* of dollars! This does not mean that we stamp the individuality out of manufacture, or invention, or decoration—it means basic sizes to common and every day things."

Just think for a moment what would be the result of such a cooperative effort among all the elements of the shipping industry here represented! Suppose that in the many items used in ship construction there existed a much greater degree of standardization than now prevails. Is it not conceivable that construction costs would be lowered considerably? The manufacturers of equipment, parts and fittings would be enabled to work more along the lines of mass-production than the present system of highly *individual*, specialized construction permits. As a consequence, the shipbuilders would have a greater flexibility of supply, a lower purchasing cost and would further benefit through lessened assembling or installation costs, as well as in a shortening of the total period between the final authorization of the plans and the delivery of the completed vessel.

Greater standardization made possible through simplification also means lower maintenance costs, for standardized parts are not only more readily procurable and more quickly interchanged for worn or broken parts but their use means large direct savings and even greater indirect savings, due to the consequent reduction of idleness or "stand-by" charges.

STANDARDIZATION REDUCES COST OF TRANSPORTATION

Standardization has been, and still is, a very important element in reducing the cost of transportation. Back in 1867, when railroading in America was yet in the early stages of development, a group of far-sighted, practical-minded men formed the Master Car Builders' Association, for the "advancement of knowledge concerning the construction, maintenance and service of railroad cars and parts thereof." Another object of the association was "to provide an organization through which the members, and the companies they represented, could agree upon joint action to bring about uniformity and interchangeability in the parts of railroad cars." Today, the American Railway Association, which absorbed the Master Car Builders' Association, publishes a "Manual of Standards and Recommended Practice" covering: Specifications for Materials, Fundamentals and Details of Car Construction, Inspection and Test Methods, and a long list of other pertinent subjects.

The automotive industry was also quick to appreciate the need and value of standards and today the standard handbook of the Society of Automotive Engineers is used by nearly every draftsman and designer in the industry.

RESULTS OF APPLICATION TO MOTOR BOAT INDUSTRY

The motor boat industry has been directing its efforts for some time past toward producing standard boats in large quantities. It is now possible for dealers, and others, in almost any part of the world to secure reliable, well-built, runabouts, cruisers, fishing and work boats, dories and house boats in any desired number, with a wide range of sizes and power plants, at attractive prices and without delay in delivery.

By standardizing its product and the components thereof, the industry has simplified the buying of spare parts and also the installation of different engines in the same size and type of hull. Not only that, but further study is being given to the interchangeability of marine hardware.

POSSIBILITIES WITH LARGER VESSELS

Is it not logical to assume that there exists similar opportunity for the application of simplified practice in the design, construction and maintenance of the larger vessels? In our correspondence with several of the groups here represented, we have received suggestions on the possibilities of greater standardization in—pipe and valve sizes, fire and deck hose, grate bars, ash ejector pipes, pistons for auxiliaries, stuffing boxes, propellers, anchor chains and dynamo brushes. Each of these items suggests a survey to determine the most commonly used types and sizes thereof, and the elimination of unnecessary varieties.

There are, no doubt, many other items used in building and outfitting, in which the existing variety in size can be greatly reduced with advantage to all concerned.

However, simplified practice applies not only to the mechanical problems, but to the commercial problems as well. For example, there is a general movement among shippers and warehousemen to simplify current commercial practice through standardizing the forms and papers passing between them and the public. The possible economies and advantages of standardized ocean bills of lading have been frequently discussed in the marine trade papers, and it is very probable that their adoption as a simplified practice will lead to similar effort to refine other features of the clerical work involved in handling cargoes, with a resultant saving in operating costs.

The direct costs of loading and of discharging cargoes may be reduced through the standardization of equipment best suited for transferring goods. Savings made in that operation mean reduction of the delay in port, thereby increasing the "turn around" and consequently the earning capacity of the ship. Greater standardization of cargo handling gear means the advantages gained in transportation will not be lost in port.

SIMPLIFICATION AN AID TO FOREIGN TRADE

But aside from those direct economies that will come to the shipping industry, if it applies simplification, there is another attractive side to the subject and that is its value as a builder of foreign trade. Many of our manufacturers know that domestic industry has outgrown the domestic markets and that America must seek outlets for her surplus products in foreign countries.

At the recent convention of the American Bankers' Association its commerce and marine commission, in reporting its studies of the merchant marine situation, said:

"It is well recognized that the United States has reached a point in its industrial and commercial development where increase in foreign trade is essential to the marketing of surplus agricultural products and manufactured goods. If producers were to depend altogether on domestic consumption, it is believed there would be a recurring demoralization of prices, due to over-production. To a considerable extent, therefore, a stabilized prosperity depends upon adequate transportation guaranteed against interruption by carriage under our own flag for the greater part thereof."

Meeting competition in transportation is mainly a matter of continuous reduction in the cost of moving a ton of freight a given number of miles. Eliminating waste through simplifying current practice will help greatly toward that end. Many of our manufacturers are meeting foreign competition by applying standardization and simplification, thereby lowering the cost and improving the qualities of the goods they ship overseas. Our Bureau of Foreign and Domestic Commerce foresees a gradual rebuilding of our export trade and is making every effort to bring the profits from it into every manufacturing center in our country. This cooperation of the Department with industry forecasts the time when there will be a far greater demand for ocean transportation than now exists. As a matter of preparedness against that time, it seems highly desirable that the economic advantages

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of simplification to the entire shipping industry be studied and analyzed. Speaking of preparedness—the same committee of bankers, just referred to, further stated that following the disposal of the present government owned fleet, "steps should be taken leading to the building of those types of vessels which our merchant marine now lacks, and which should be built with a view to use as naval auxiliaries in case of war." Standardization should play an important part in any new construction, and now, when things are quiet, is the best time to decide what that part will be.

It savors of ancient history to talk much now about the Great War, but it is only good sense to apply the lessons we learned then to our plans for the future. Those of you, who aided in the hurried building of our ships then, know only too well that the lack of standardization was, at first, a *great obstacle* to rapid construction and a serious factor in the multiplication of costs. Later, it proved to be an essential element in winning the war.

It may interest you to know that the War Department is closely watching the present trend of simplification with regard to its importance in national preparedness. They see in it possibilities for quicker mobilization of requirements, through having available maximum quantities of standardized articles. Such articles, by reason of their relative ease of production, permit greater flexibility of supply, with a minimum disturbance of processes and a minimum displacement of labor.

Foreign Countries Applying Standardization

If there were no other reason for immediately attacking this problem, the activity of foreign countries is sufficient! Eleven European nations are applying standardization—so is Japan, and also Canada. The British are very active in its application to marine problems, the British Engineering Standards Association having published specifications for: Structural steel for shipbuilding; main and auxiliary boilers; steam feed pipes, cocks and valves; condenser tubes; shafting for marine engines; hinges and locks for ship's joinery work; table glass and crockery; oil lamps, and also vertical bollards, or bitts. That body is working on nearly forty other simplifications.

The *London Times* said in a recent editorial, "it seems certain that industrial supremacy in the future will depend very largely on the simplification of manufacturing processes to avoid waste."

Not long ago, the Norwegian Standards Association asked the American Engineering Standards Committee for a summary of the standards developed for American marine construction. Here in America, we ought to have some center of information that will keep us all fully informed on what the other nations are doing toward lessening construction, operation and maintenance costs. Secretary Hoover said recently that, if we are to maintain the industrial and commercial lead which standardization has given us over the other industrial countries, we must carry it much farther than we have.

We are told that American shipping cannot compete with foreign shipping, that certain legislation revision as well as certain financial assistance or cooperation is necessary. Granting the truth in those statements, neither of those measures in themselves will automatically produce lower costs, volume business and faster or better service—which in the last analysis form the real basis of competition in any form of commercial activity. And until every group or association concerned with our merchant marine problem is actively engaged in a united and concerted effort to improve the science and art of ocean transportation, through eliminating all avoidable wastes and simplifying current practice, the industry as a whole will not be living up to its true responsibility and obligation to the American people, from whom and to whom it is looking for support and cooperation! Standardization, simplification—call it what you will—is a potential economic force which we should put to work for us.

Standardization when brought about by producers or consumers alone may cause suspicion as to the motives but when all interested parties, including the Government, cooperate in the project, then there can be no such question. An opportunity for such cooperation is found in the Simplified Practice undertaking sponsored by our Secretary of Commerce.

How Simplified Practice Is Applied

When the principles of Simplified Practice are applied in any field, all interests—producing, distributing and consuming—agree to recognize certain dimensions and varieties, among the tremendous diversity produced, as a standard practice for the ensuing year, or other period, set to the agreement. The remaining sizes and varieties are eliminated by mutual consent as obsolete, unimportant or poor practice. Major production is thus directed to a temporarily standardized line, while the engineers, designers and inventors are left entirely free to develop all possible improvements. At the end of the period covered by the Simplified Practice Recommendation, the industry again convenes and makes such modification in the recognized varieties, as may be necessary to include advances in the art.

In Secretary Hoover's plan, the recommendations adopted are published by the Department of Commerce, which through its Division of Simplified Practice, accumulates data on the percentage of product made or consumed in accordance with these recommendations and on the special varieties which are found necessary. The Division thus gathers information for subsequent conferences, permitting intelligent modification of recommendations.

In certain fields, such as weights and measures, establishment of permanent and absolute standards is obviously not only warranted, but vitally necessary. In industrial and engineering fields, on the other hand, it seems probable that the elementary and flexible simplifications contemplated in the Hoover plan will prove a most valuable modification of the earlier standardization conceptions.

Suggestions Offered

If then you feel that there are some worthwhile gains to be made through this form of waste elimination, I would suggest.

1. That there be formed a Central Committee, or "American Marine Council," made up of representatives from every association or group interested in, or connected with, our merchant marine problem.

2. That this council, if you please, be given the responsibility for a comprehensive survey of the facts to determine:

(a) the prevalent wastes in current practice, both commercial and engineering, and

(b) the extent to which simplification and standardization may be practically applied throughout all phases of the industry, and

3. That a definite time be set for the completion of the survey, and for another general meeting to receive the report, and act on its recommendations.

When that time comes, we cordially invite you to hold the meeting at the Department of Commerce in Washington, and to make full use of our services in achieving your objects.

New Radojet Pump.—At the Marine Exposition the C. H. Wheeler Manufacturing Company, Philadelphia, Pa., exhibited a new Radojet pump showing combined inter and after condensers. Heretofore there has been a separate inter condenser condensing the exhaust steam from the first stage of the radojet and a second after condenser condensing the exhaust steam from the second stage of the radojet. These have now been combined into one unit.

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Standardization as Affecting American Shipbuilding*

By E. H. Rigg†

During the last two decades there have been many converts to standardization; it has made stronger headway in fields other than shipbuilding, and there is almost no one today who will deny the value of the general principle. It is when you come to apply it to concrete cases that difficulties arise. Without standardization, shipbuilding, as we knew it during the war, would have been impossible; the question is therefore on the extent to which it shall be carried rather than on whether or not standardization shall be adopted.

IN shipbuilding standardization much has been done by such bodies as the Federal Bureau of Standards, the American Bureau of Shipping, the United States Steamboat Inspection Service, the American Society for Testing Materials, the American Engineering Standards Committee, also the Treasury and Navy Departments. The Navy Department is mentioned here last merely because this paper mainly deals with merchant shipping. On navy work, navy standards are naturally paramount, and their influence also extends into merchant work in yards doing both kinds. Owing to the service conditions under which warships operate, these standards are generally more exacting than those governing merchantmen.

Apart from the well-known and long-established classification societies, there is a relatively new body of this nature that bears on our business to a considerable extent, namely, the British Engineering Standards Association, whose work in standardizing specifications for structural materials, products and fittings entering into ship construction is decidedly more far reaching than anything we have; however, as noted above, we are by no means without similar bodies.

Standardization is a large subject. The deeper one gets into it the larger the possibilities, and, as would be expected, the more impressive the difficulties.

A paper on this subject read before the North East Coast Institution of Engineers and Shipbuilders by Mr. C. leMaistre, secretary of the British Engineering Standards Association, in March of this year, is both interesting and informative. One among many interesting points brought out is to the effect that standardization has reduced steel costs of production by at least 5 shillings (nominally $1.25) per ton; such points effectually nailed down as proven will do more than many sermons to convert the skeptical. A study of this paper will well repay those interested and will also show the standing which standardization has already attained in shipbuilding abroad.

An extremely interesting test of the value placed on standards is to ask one of our yards to build a vessel using Whitworth standard screw threads throughout. It looks fairly innocent at first, but wait till you begin writing to the makers of the auxiliary machinery, to say nothing of your own machine shop's feelings in the matter!

Standard Ships

Taking standardized ships first, as distinguished from variegated ships built from standard parts: during the war we built many such standard ships; the Hog Island, Submarine Boat Corporation and Great Lakes numbers and types of standard cargo vessels stand out pre-eminently as the biggest efforts along those lines. There were also other standard cargo types, but these were built in fewer numbers. The vast numbers of submarine chasers are another instance, also the large number of destroyers built for the Navy.

The cargo vessels above referred to were laid down to meet a war need, it is true, but they remain distinct from the strictly naval vessels. As one effective answer to the submarine campaign of the enemy, they, without doubt, fulfilled their object. The 7,825-ton Hog Island boats are a more generally useful type than the Submarine Boat 5,075-tonners or the Great Lakes 4,200-ton steamers, useful as these smaller vessels are in such localities as the Baltic and on the short-run trades.

That we shall again witness such an effort is not probable; further, that this effort has helped to put a quietus on general cargo vessel construction for some time ahead is also to be admitted. As an example of standardized work which justified its conceivers, there is no doubt that it did more than make good; while there were differences in detail in these groups, such minor variations did not alter the status of the ships as standardized products. These detailed differences sometimes indicated progress, but were in many cases unjustifiable and extremely annoying to the builders; they serve to emphasize one of the main arguments against standardization, namely, that it prevents progress. Automobiles are standardized, but that does not prevent improvements being made in the 1922 over the 1921 model. In the same way, succeeding ships for a particular trade can and do embody improvements over the earlier ones.

The situation for standard ships would appear to be as follows: In emergency, when large numbers of ships are wanted in a hurry, by all means build to a standardized design. When all are building in one yard this holds absolutely; when building in several yards it holds in general, with the qualification that each yard should be allowed to adhere to its own general way of doing business and to work to the same general plans and specifications in its own way, with freedom as to details. This can be qualified to say that full consideration should be given to a yard having plans, etc., available for a vessel substantially equivalent to the proposed standard ship.

Main and auxiliary machinery should be common to all ships of the type and therefore interchangeable from ship to ship to a very large extent; this has helped deliveries frequently when a broken part in an earlier ship can be taken from a later vessel.

As a normal proposition, wholesale standardization of complete ships is not to be looked for. It cannot be denied, however, that there are so many tramps of certain deadweights as to very closely approximate standardization. The large class of 7,000 to 8,000 tonners is worth noting, even though we have variety in detail to suit different builders' and owners' ideas.

When repeat orders are given for a vessel already built, the work is thus partly standardized. There are many instances of this on record; a type proves satisfactory in service and may be repeated at intervals in groups as many as fifteen or twenty times, with only minor and detail changes. The work is thus spread over a period of years, so that the advantages due to repetition work in the shops do not enter into the consideration. The main advantage is in time,

*Paper read before the Society of Naval Architects and Marine Engineers, New York, November 9, 1922.

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because the design, plans, material-orders and specifications are immediately available.

Oil and cargo ships come in the repeat-order category rather than passenger ships. The Shipping Board 535-foot passenger ships were an example of a large number of ships laid down to the same original plans as troopships, but finished up in groups for several lines and services as passenger ships. The hulls were practically identical, but even here changes were made to get different oil-fuel capacities; the machinery was built in groups to spread the work to different boiler, turbine and gear plants, so there was only partial standardization in machinery. The passenger accommodations were most wide of "sameness." While it is misleading to say that no two ships were alike, it is fair to say that with sameness of outline plans we have very considerable differences in detailed arrangements and decorative schemes, so that these differences finally resulted in a fleet wherein there were greater or lesser differences in every ship. Arguing from this and from general experience, standardization of passenger ships may be dismissed from serious consideration, except in quite small groups. Shipbuilding, in the nature of things, does not lend itself to standardization as a whole, but to build large ships in groups of limited numbers, suitable to particular trades, is a practice as old and older than anyone living today.

There is a large field where more has been accomplished than meets the eye on first approaching the subject, namely, international agreements on such matters as rules for avoiding collisions; signal codes; tonnage laws; lifeboats, and subdivision of passenger ships. Working agreements between classification societies in different countries tend toward broad-gage standardization. Standard loadline regulations are well on the way to international scope. Agreement to recognize each other's inspection certificates covering passenger and crew accommodations between countries having substantially the same regulations is another step towards the common goal.

The tendency toward international codes covering the fundamentals of shipping both as to building and to operating is right and proper, particularly when it is remembered that the high seas are world wide and provide highways common to all nations. The sea does not ask if a ship be American or French, but treats them all alike; hence the growing volume of international standardization of fundamentals is to be welcomed and helped as a means of getting along better with international intercourse and trade.

STANDARDIZATION OF MATERIALS

Turning to the standardization of parts entering into ship construction, we find much to study. We also find great progress to record. We even find some progress towards international standardization, though this phase of the problem has naturally not progressed nearly as far as international covenants covering broad principles.

Consider the steel of which ships are nowadays constructed. Wood, iron and concrete need not be considered here, because merchant shipping today is, to all practical intents and purposes, universally constructed of steel or steel products.

International specifications for ship steel have not yet arrived in spite of efforts which were under way when the war broke; the difficulties are great, and they begin in the mines where different ores have different characteristics and properties. A universal specification is difficult to draw that would avoid undue favor to some mills as compared with others. American, British and German steels have their own characteristics, but given a willingness to cooperate, it should not be impracticable to draw specifications broad enough to cover a merchantable article satisfactory for use the world over. One great question is: Can genuine willingness to agree, if possible, be obtained? Without at least that as a basis, it is no use trying for international steel standards.

During the war, considerable progress was made towards international standard rolled sections, such as angles, channels and bulbs; this as between America and Britain. Here we have two standards, structural shapes and ship shapes, these ship shapes being identical with the British except in minor points; there they have one set of standards for bridges, buildings and ships. There is considerable opinion in favor of a single standard here. The manufacturers fear scrapping of equipment before it is worn out; the answer is that properly regulated standardization is not an over-night affair and will involve no scrapping of good equipment. France has been on a metric basis of measurement almost as long as the memory of man runneth, but I am told that even yet in the remote rural districts the old non-metric units are largely used in local trading.

The inch, pound and metric units involve us in trouble when considering international standards. The obvious way to get around it is by printing two columns parallel to each other; customers in metric countries can use the one in which they can think best. The metric system, or lack of it, is no bar to international standards, though it is an admitted difficulty, which benefits the printing trade more than anyone else.

Since the war, progress towards international rolled steel standards is to be noted on the part of Australia, Belgium, and France, as well as between ourselves and Britain. Plain angles present few difficulties; the channels, bulbs, and I-sections are the crux of the matter. Standardization of what we may term secondary ship materials such as brass, bronze, iron and wood is also to be kept in mind.

Again a real question is: How willing are the different parties to go at the matter and find a solution that will give the best sections designable and commercially manufacturable at this date? Without this willingness, we are merely beating the air.

The war has done at least one good thing: It has taught us that undertakings before considered impossible can be put through provided the will to accomplish is there; that men and women of many races can forget petty differences and work together for a common goal. Whether broad-gage sentiments similar to those inspired by the stress of war can also be invoked for peace-time objects is at least open to debate, especially in the present condition of world affairs.

Again, do the foreign trade elements of each nation want uniformity in these matters, or do they want the Tower of Babel?

The transition stage would have its troubles; the present state has its disadvantages. The same solution for steel specifications, both as to composition and dimensions, as has already been applied to such matters as tonnage, safety regulations, etc., would appear to the writer as the proper one, namely, broad-gage standardization on an international basis with equitable leeway to each nation as far as individual peculiarities are concerned, such as extend from mine to finished product.

In developing new countries, is it an advantage or a disadvantage to have similar structures and equipment built to varying specifications, and to whom do the advantages and disadvantages accrue respectively?

It is to be noted that the Department of Commerce, under Mr. Hoover's leadership, is endeavoring to eliminate waste and reduce costs and so to extend the benefits resulting from simplified practices in industry. The machinery that it is proposed to set up will be representative of all interests concerned and will have safeguards to prevent rejection of newer and better ideas as they come along.

Mr. Hoover uses the word "simplification," which is not the same as "standardization," though in many respects the two will be hard to separate. It is well to bear in mind the

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differences between the two words; their meanings and applications will converge and diverge as we study our subject in all its ramifications.

The procedure suggested by Mr. Hoover is very much that of the American Society for Testing Materials, where producers and consumers sit down together and agree to agree or disagree on standard specifications for the major materials and their subdivisions.

A study of Mr. leMaistre's paper referred to above will throw an interesting light on what is being done along the lines of standardization and simplification in British shipbuilding and other industries.

A study of the pocket books issued by the different steel manufacturers will impress one with the vast number of special shapes to which steel is rolled; that a gradual reduction in number of special shapes would benefit everyone concerned will hardly be disputed. As existing commercial equipment wears cut this becomes at least possible.

STANDARDIZED METHODS

Regarding standardized methods of production, shipyards are organizations subdivided into many departments or trades. They are not unaware of what is going on in the general industrial world in the way of advanced methods. There are at least two good reasons why the practices of factories, pure and simple, cannot be fully applied; one is the diversity of product as between ship and ship, and the other is diversity of parts entering in to any one ship.

What all efficient yards are doing, particularly since the present depression set in, is to so organize their methods as to adopt for each shop the best that can be worked in. We all have certain routine ways of doing things. In a poor plant the routine runs the plant for a certain or uncertain season; in a good plant the routine is modified and improved conservatively and constantly in such a way as to cut down work, save time and labor, eliminate duplication, and also secure harmony and effective intermeshing of departments.

Too much departmentalization will kill any shipyard. You all know the small-minded departmentalist who cares not what happens to the department on each side of him, just so long as his particular department makes a good showing.

Modern established yards have their own standard ways of handling work; from design to delivery, standard forms and methods are used. These should only be changed conservatively, and after the management is sure that they have all the cards on the table; a change made to suit one noisy departmentalist will almost surely bring trouble and can very easily change a profit into a loss on the completed ship. We also have standard specifications. For yards handling more or less one line of work, this is undoubtedly correct; for yards with a diversified product it is still correct, but cannot be made to work without greater labor in adjustment to particular cases. These specifications should follow in arrangement the yard charge and plan numbering system, so that an index is unnecessary to one familiar with the system, thus saving more time for more people than will be realized. The index should be there for convenience of owners and others not acquainted with the system.

It seems hardly necessary to say that all forms and drawings should be uniform, also all calculations, material-orders and correspondence methods. The responsibilities and limitations of each department should be clearly defined and no point left in the air to fall hapless between two or more parties.

STANDARD DETAILS AND FITTINGS

We now come to standard details. Each established yard now has its own standards and each owner has his own particular requirements. Each yard wants to use its own standards, which works for a cheaper ship.

The British have decided that there is no good reason why a lot of fittings and equipment cannot be nationally standardized and, having decided so, they are doing it. There is a host of fittings that lend themselves to this treatment, such as manholes, airports, doors, davits, boats, bitts, cleats, chocks, sanitary fittings, winches, windlasses, anchors, chains, steering gears, etc., down to minor fittings such as cups and saucers. Providing the standards are of a good quality and agreed upon by the jointly interested parties, why nct eliminate as much special work as we can? This British experiment is well worth noting as we press on our way to the building of ships economically.

With standardized fittings it is easy to see both time and money saved; stocks can be kept fuller without fear of loss.

STANDARD MACHINERY

With reference to machinery, we have just arrived at standard specifications for moderate-powered, reciprocating-engined, Scotch-boilered cargo boats. We arrived there, however, in the midst of the modern upheaval in methods of propulsion; the claims of Diesel drives, Diesel-electric drives; electric, hydraulic or mechanical reduction-gear drives, direct-turbine drives, watertube boilers versus cylindrical, also last, but scarcely least, the war.

The standard specifications here referred to are those prepared in Britain with a view to harmonizing classification and governmental requirements for main engines and boilers and giving to builders one set of rules and specifications to work to. What success has attended their practical working is not known to the writer.

The reconciling of classification and governmental requirements where these overlap is something which will save time and money; the application of two or three formulæ to figure out the same dimension involves duplication of effort and, consequently, waste.

Motors for ship propulsion are a modern development. We already find elaborate standardization here for several reasons; with uniform power per cylinder, engines of four, six or eight cylinders are built. Oil engines are complex affairs at the best; the more parts to a given design the lower the already high cost per unit of power can be kept. Further, their manufacture commenced at a period when the benefits of standardization were already realized.

Electricity plays an increasingly important part in the auxiliary installations aboard ships. This industry is already highly standardized. The requirements of land and sea services should be brought as nearly to a common basis as is practicable.

REPAIRS AND UPKEEP

The importance of quick turn around in ports needs no emphasis before this body. The advantage of standardization in giving owners and repair plants a reasonably generous stock of spares to draw upon is obvious. With greater standardization in building, especially in machinery, we automatically get advantages in the matter of prompt availability of parts for repairs and renewals, the economy of which speaks for itself. The more general the standards, the fewer and less expensive the spare parts each individual ship will need on board. Certain parts liable to be needed at sea will always have to be carried, but stocks at terminals can be kept lower without danger of delay to the ship.

Standardization is a natural and inevitable corollary of modern industrialism; mechanisms are both more elaborate and more generally used than formerly. A plant in Chicago manufacturing and selling any one or more of many well-known modern mechanisms must consider the ability of its distant customer to keep the machine in condition. What ultimate good is a typewriter, for example which the owner cannot keep in repair; the "throw it away and buy a new one" answer is that of the reckless cub salesman, except after

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the machine is worn out or genuinely obsolete. The only proper answer is standardization of machine and of such spares as are most liable to be needed, backed up by the most efficient distributing agencies available.

UNIFORM REQUIREMENTS

The codification of governmental requirements for merchant vessels under one set of regulations should be aimed at; at present these are scattered and come under different departments for enforcement.

The reconciliation of the requirements of two or more bodies with concurrent jurisdiction is very important. The most outstanding case is perhaps that of boilers, the United States Steamboat Inspection Service and the classification societies each having their own formulæ. The success which has attended the adoption of the A. S. M. E. Boiler Code for land work needs no emphasis.

That the practical benefits of uniform requirements on an international basis are not lost to sight is evidenced by the recent reports of the committees appointed by the International Shipping Conference last November. These reports mark a step towards agreement on four important questions connected with shipbuilding, namely, life-saving appliances, wireless telegraphy, loadline, and passenger ship subdivision. The absence of United States representatives on these committees is to be noted, the writer feels, with regret.

Uniform standards of strength for ocean-going vessels may well be considered; the proposed international loadline regulations give us a basis. The various classification societies each have their own; in practice they are fairly close to uniformity. The extent to which their rules could with advantage be standardized might well form a subject for future discussion.

SUMMARY

History has shown conclusively that standardization has already greatly benefited mankind; imagine the chaos if each mechanic cut screw threads to suit his own ideas, as was done in the early days. The whole point is that of arriving at well-balanced decisions on how far to go. Excessive standardization makes for lack of progress, while too little tends to restrict production. The right amount means the maximum of comfort and pleasure in life for the minimum cost, *i. e.*, the greatest good for the greatest number. The Ford car, Singer sewing machine and Remington typewriter are good examples.

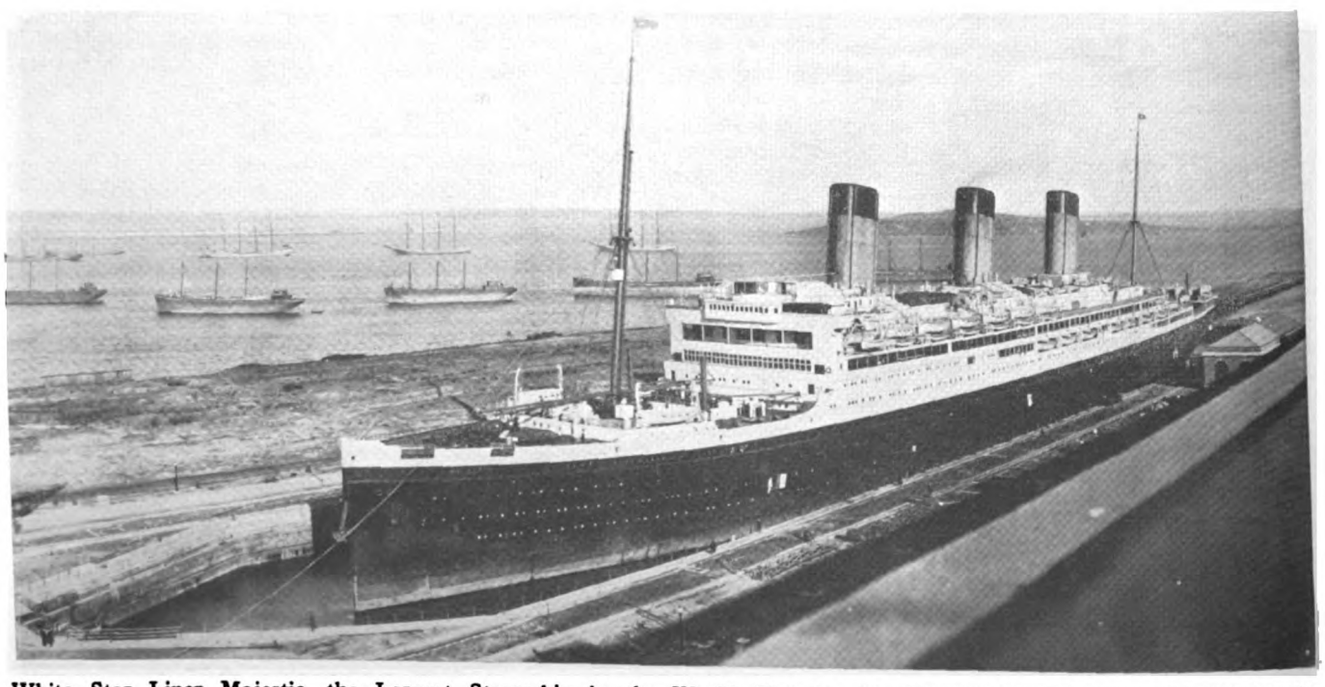
The same general principles can be applied to shipbuilding, particularly in countries where the volume of business is so proportioned to the number of plants that each can specialize along certain definite lines. There are different designs of cars, sewing machines and typewriters, each made by the same plant but for different purposes, so that even where standardization is most developed we do not find absolute uniformity.

Portugal to Have Bargaining Tariff

BY a decree of August 25, promulgated August 23, the Portuguese Government, according to advices received by the Department of Commerce, is authorized to introduce and bring into force immediately a new customs tariff, revising the rates of the double scale of maximum and minimum duties which have been in effect since November 24, 1921. This decree gives effect to the bill for this purpose introduced last May.

The projected tariff is to be revised again in 1923 and then adjusted to current conditions every five years. The basic rates may, however, be modified by the Minister of Finance, on the recommendation of the Council of Experts for the Customs Service. The government is authorized to conclude reciprocal commercial agreements with foreign countries in which the "minimum" tariff is to mark the limit of concessions on the part of Portugal. Such agreements are to remain in force not over one year.

Of particular importance to American exporters is the provision that during a period of six months from the date of publication of the new tariff any complaints may be presented to the Council of Experts for the Customs Service. After investigation of the complaints, the Council of Experts is to present their opinion to the government, which is authorized to make such necessary corrections in the tariff as seem advisable.



White Star Liner Majestic, the Largest Steamship in the World, Entering the Largest Dry Dock in the World, the Commonwealth Dry Dock in Boston Harbor

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Recent Developments in Marine Insurance

Shipping Board Ratings Completed—Casualty Returns—Unrepaired Partial Losses—"Certificate" Vindicated—Better Hull Rates Wanted

By "Bordereaux"

FINAL recommendations of the various sub-committees of underwriters with respect to the rating of Shipping Board vessels for cargo purposes have all been turned into the central committee and the consolidated report has been transmitted to the Washington authorities. Liner ratings have been granted to a number of operators in particular trades, and "approved steamer ratings" have been given all of the old established operators. Uniformity has been arranged for as between different trades in which substantially the same basic conditions prevail between tonnage and other operating details of Shipping Board and competing lines.

The recommendations are made on the condition that they shall remain in force only so long as the vessels operated by the several Shipping Board agents are maintained in a condition of upkeep which meets with the approval of the United States Salvage Association, and are not loaded beyond their assigned marks. The Shipping Board has agreed to this.

For the information of the underwriters, arrangements have been made with the Salvage Association to issue periodical bulletins advising the names of the ships in the hands of the various operators which may be approved by it for the classification herein provided. Notice of the withdrawal of such approval, and also of any instances of overloading, will be promptly sent out to the underwriters.

The Conference Committee of the underwriters expresses the earnest hope that the various cargo insurers will recognize the improved conditions by adopting the recommendations. In this connection attention is called by the committee to the effort of the present managers of the Fleet Corporation to increase the efficiency of their operating agents and to promptly meet the reasonable requirements of the United States Salvage Association, of which ample evidence has already been had, and also because of their promise to extend to cargo claims consideration equally prompt and equitable with that executed by their privately owned and operated competitors.

Marine Casualty Returns

THE Liverpool Underwriters' Association has issued a classified return of casualties to vessels of 500 tons gross register and upwards, which have been posted in the loss book during the month ended September 30, 1922. Taking into account both British and foreign vessels, steam and sail, it shows the following record: Weather damage, partial losses, 28. Founderings and abandonments, total losses, 3. Strandings, total losses, 6; partial losses, 127; total, 133. Collisions, total losses, 3; partial losses, 143; total, 146. Fires and explosions, total losses, 1; partial losses, 57; total, 58. Missing, 1. Damage to machinery, shafts and propellers, partial losses, 75; other casualties, 12; total, 87.

The number and total gross tonnage of vessels lost, posted in the loss book during the month of September, 1922, were as follows: British, sail, none; steam, 3; gross tonnage, 5,898. American, sail, none; steam, 1; gross tonnage, 691. Japanese, sail, none; steam, 1; gross tonnage, 989. Rest of the world, sail, 2; gross tonnage, 2,721; steam, 7; gross tonnage, 18,701. For September, 1921, the total of gross tonnage casualties in the entire world was 29,789; for September, 1920, the same item was 32,338.

How Unrepaired Partial Losses Work Out

IF an unrepaired partial loss on a hull is followed by a total loss during the currency of the policy it cannot be collected from the underwriters. And yet, if, at the expiration of the policy, repairs have not been made, the underwriter is obliged to pay for the same, even though a total loss occur under the subsequent policy before repairs have been made. The logic behind this rule rests on the ground that the valuation under the renewal policy would not be as high as under the first policy, due to the unrepaired condition of the ship; that is to say, the subsequent total loss payment would be reduced to the extent of the unrepaired damage. By this reasoning there are instances where the owner is able to recover more than the value of the vessel, because frequently the renewal policy is placed some time previous to the expiration of the first policy and while the vessel is still in sound condition. After placing the renewal policy on the same valuation as the original policy, and before the expiration of the first policy, should a loss occur which is not repaired before the attachment of the second policy, then the underwriter on the first policy must pay the estimated cost of repairs. If a total loss then occurs under the second policy before repairs are made, the shipowner will have recovered more than the amount of the insured value of the vessel.

Displacement Invention

A DEVICE has been invented by a French ship engineer, according to a report recently received from Consul Wesley Frost, of Marseilles, France, by which the amount of water displaced by a vessel can be ascertained at any given time. It consists of a water tube or gage installed in the center of a ship. It is very simple in construction and can be installed at a minimum of expense. Underwriters are interested in the invention, because of the opportunity it affords for securing at any time an accurate indication of the weight of the cargo aboard.

"Metal Mike"

INSURANCE men are always alert to measure the advantages to be derived from new inventions that may have a bearing upon the safety of ship and cargo. Their attention has been called to the satisfactory working of a mechanical device, popularly dubbed "Metal Mike," that, it is claimed, will hold a ship to her course at sea without the aid of a quartermaster. Should the vessel deviate from the set way, warning is given by the automatic ringing of a bell. This interesting steering apparatus is not employed in entering harbors. It was first used experimentally on a German steamer in 1915, but never on an American ship until a week or so ago.

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New Tariff on Ship Repairs

THERE is a feature in the new tariff that gives promise of concealing a vigorous back-fire for marine underwriters. That is the ad valorem tax of 50 percent on the cost of repairs to vessels of American registry when effected abroad, unless caused by stress of weather. Prominent insurance men pronounce it "outrageous," and see in it a serious handicap to the extension of our merchant marine. The penalty for non-disclosure is the confiscation of the vessel. The question arises whether, in event of a claim for repairs on which the tax is collectible, the underwriters can be required to pay the tax. This feature of the new law means that American vessels will have to be repaired in American shipyards where, it is generally believed, costs are considerably higher than those charged by European or British repairers. It would seem that the new tax prohibits the effecting of repairs, to any great extent, abroad, thus imposing a burden of 50 percent additional upon American ships.

Extra Charge for Buffalo Lay-ups

IN consequence of the slowness of the Government in making necessary repairs to the breakwater at Buffalo underwriters are imposing an additional premium of three-quarters of one percent on boats laying-up at that port through the present winter. The regular lay-up charge is twenty-five cents; which means that the additional cost will bring the premium up to one percent. Lake hull underwriters held a special meeting at New York a few days ago for the purpose of discussing the situation, and a representative was sent to Buffalo to study conditions there and report back to the underwriters. The result has been a serious discountenancing of using Buffalo for laying-up ships under prevailing circumstances.

London Reduces Tank Steamer Rates

A BIG break in tank steamer rates is reported from England. Underwriters complain of a slender margin of profit at the old rate of 4½ percent, and they fear the worst now that tankers are being freely covered at 3½ percent. A large portion of the orders of this kind come from America, where some of the largest fleets are owned. On these the all-risks rate of 4 percent has been for American coastwise trade, with an additional premium of one percent for Institute warranties. These risks are now being placed at a flat rate of 3½ percent, with an additional ½ percent for Institute warranties. This brings the rate, with full transatlantic privilege, to a point one percent less than it was a year ago.

The "Certificate" Vindicated

THERE is great satisfaction among insurers over the recent decision of Mr. Justice Sankey, of the King's Bench Division of the English court, to the effect that a marine insurance certificate is a valid tender when substituted for the original policy. Our readers will recall the mild consternation with which American underwriters received, a year ago, the decision of Mr. Justice McCardie, also of the King's Bench, in which he ruled against the substitution of a certificate for a policy. That judgment has had little effect upon the continued use of the ever-popular, time-saving certificate, but occasionally a bank or ultra-cautious shipper would complain that he did not feel secure in the face of the finding of the British court. Now comes Mr. Justice Sankey, of equal rank with Mr. Justice McCardie, and sustains the certificate. His judgment was given in a suit brought by Donald H. Scott v. Barclay's Bank, Ltd., and the full text may be found on pages 502-506, Part No. 7, Vol. 12. of Lloyd's List Law Reports. The language of the judgment reads as follows: "I find that the certificate was a policy within the definition I have given to which no reasonable mercantile objection could be made on the point of it being a certificate as distinguished from a policy."

The suit also developed an objection to the certificate on the ground that it was a "dollar" insurance against a sterling letter of credit; but this was also brushed aside by the Justice as being without merit.

Bureau of Shipping's Slate

A COMPLETE slate for its board of managers has been placed in nomination by the American Bureau of Shipping for election at the meeting of January 31. All are up for re-election with the exception of George J. Baldwin, of the American International Corporation, who wishes to retire, and in whose place appears the name of Asa F. Davison, general manager of the United Fruit Company. There is to be an addition to the regular list in the presentation of the name of H. A. Magoun, vice-president of the New York Shipbuilding Company. The Board, as nominated, is as follows: John S. Ashley, Louis F. Burke, H. L. Coulby, William J. Davidson, Asa F. Davison, William A. Dobson, Homer L. Ferguson, Richard D. Gatewood, Edward C. Gillette, William R. Hedge, William H. McGee, Samuel D. McComb, Frank Gair Macomber, Charles E. Mather, H. A. Magoun, Frank C. Munson, Charles R. Page, Walter Wood Parsons, Antonio C. Pessano, Joseph W. Powell, H. H. Raymond, John C. Rohlfs, Benjamin Rush, Alfred Gilbert Smith and Joseph J. Tynan. Douglas F. Cox, of Appleton & Cox, and A. F. Davison, of the United Fruit Company, were added to the list of members. It is proposed hereafter to have special sub-committees of the Technical Committee on Naval Architecture and that on Marine Engineering appointed.

Deposits and Forced Sales

THERE is current among underwriters an increasing dissatisfaction with what they regard as flagrant culpability on the part of many shipowners in transfering to their own funds general average deposits and monies realized from the sale of damaged cargoes. The proper custodians for such funds are the regularly selected trustees. Furthermore, it is felt that there is too much delay in distributing the proceeds of cargo sales, resulting in serious disputes with respect to interest due the owners of the money. The evident disposition is to enforce these objections upon shipowners with considerably more firmness than has been the custom of recent years.

Better Hull Rates Wanted

ONCE again the season for the renewal of hull rates has rolled around and with it comes a determination on the part of underwriters to have more rate. It is pointed out that values have continued to decline and that there is no immediate prospect of their attaining a higher figure. Added to this is the meager reduction in the cost of repairs, by no means proportionate with the fall in values. These two elements enter vitally in underwriting calculations as respects particular average costs. They bring the premium volume down and, at the same time, compel the insurers to make disproportionate expenditures out of a decreased income. The difficulty is increased because such a situation invites an abnormal volume of particular average claims. The market would have a better chance to right itself, if it were less extensive than it is at the present time. With so

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many companies writing insurance there is too much competition, the result being that all sizes of hull lines are absorbed with ease. Brokers find no difficulty in placing even undesirable hulls, and they can secure rates that practically preclude hope of even the narrowest margin of profit to the underwriter. Violent competition has already sent tanker rates still further down, and the prospect is that the end is not yet in sight.

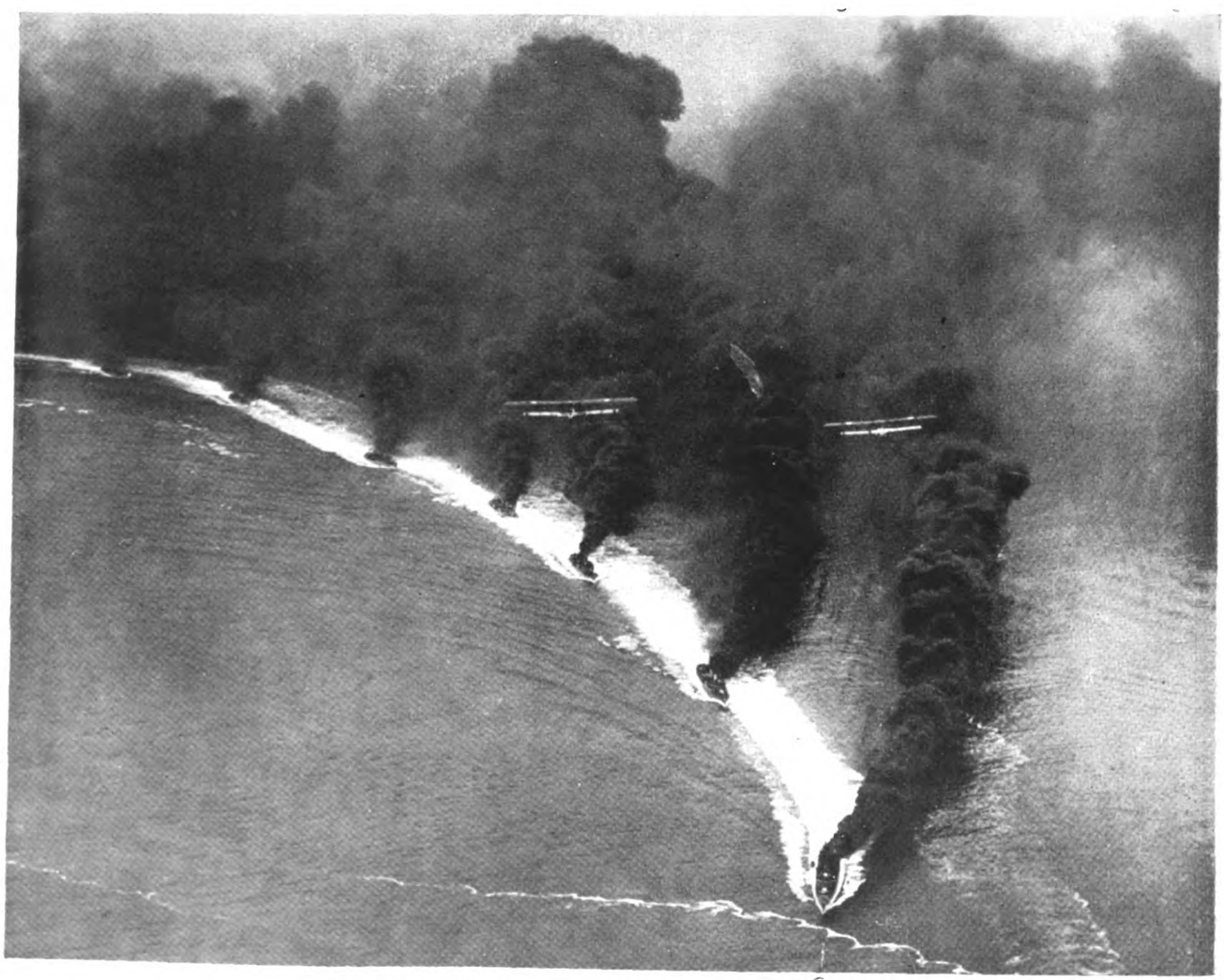
Co-operation in Lay-up Returns

AFTER more or less discussion Lloyds and company underwriters in London have reached a co-operative arrangement by which claims for returns on account of vessels laid up idle in port shall be submitted to a central examination. A joint committee is to sit daily at the Institute of London Underwriters and claims of this character are to be laid before it for consideration. Upon the approval of such claims by the committee all the underwriters concerned are to settle at once without going any further into details. It is confidently felt that such an arrangement will prove advantageous to both brokers and underwriters, in that it will economize time and introduce uniformity in method.

Unit Type Packing Adapted to Marine Engine and Valve Service

A UNIVERSAL unit type packing, composed chiefly of shredded asbestos, graphite and finely divided antifriction metal, is being marketed by Metalastic, Inc., 280 Broadway, New York. It is claimed that this packing is suitable for every type of stuffing box and valve in the engine room since it is in shredded form and takes the shape of the box or valve in which it is placed. Its composition is such that it will resist acids, ammonia, carbon dioxide, brine, etc., and has withstood pressures up to 8,800 pounds per square inch without blowing out.

It is claimed that the universal feature eliminates maintaining a variety of packings for engine service. Metalastic is guaranteed to have features of self-lubrication and not to score rods. In this connection the company states that it has been used successfully in steam turbines running at 3,600 revolutions per minute under 185 pounds' steam pressure and at a temperature of 480 degrees F. for twenty months without re-packing. It is claimed that the packing never solidifies and can be removed at any time and used again.



Destroyer Maneuvers off San Diego, Cal. *©Keystone View Company, Inc., of N. Y.*

View of destroyer maneuvers on the southern drill grounds of the Pacific fleet of the United States Navy, showing dense smoke screen raised by the destroyers into which the airplanes seek protection.

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President Harding Expresses Warm Interest in American Marine Week

October 28, 1922.

My dear Secretary Denby:

I learned through Col. E. A. Simmons, president of the American Marine Association, that you are to address the banquet of the Society of Naval Architects and Marine Engineers in New York on November 9. It was with much regret that I was compelled to decline the invitation to be present at the same time, and I am now writing to ask you to express to the gathering my warm interest in the work of this organization and my conviction that it represents a most useful contribution to the development of American maritime interests. I am sure I do not need to add much to what I have said on other occasions concerning my profound interest in and concern for the future of the American merchant marine. Its development and continued usefulness will not fail to constitute a large contribution toward the broadest material prosperity and the truest security of our country. It is always a satisfaction to acknowledge the debt which is owing to such volunteer organizations as the American Marine Association for the efforts in behalf of this great cause. Most sincerely yours,

(Signed) WARREN G. HARDING

October 25, 1922.

My Dear Mr. McFarland:

I regret exceedingly that it is not possible for me to be in attendance at the banquet of the Society of Naval Architects and Marine Engineers, which is to be held on the evening of November 9th, in connection with the program of observances of American Marine Week. With all my heart I wish I might be a participant on that occasion. No one purpose more enthusiastically enlists the attention of the present administration at Washington than that of turning our vast assets in ships into a live and efficient Merchant Marine. Every day adds to the conviction that the upbuilding of our Merchant Marine is of first importance in assuring our national defense and of incalculable importance in maintaining America's fitting place in the commerce of the world. It would be a pleasure to me to express some of my hopes to those who will be present at your annual banquet. Since I am unable to attend I will thank you to convey my very cordial greetings and to express the hope that American Marine Week and the notable meeting of your society will add to American conviction that we must establish and maintain this agency of transportation on the high seas if we are to maintain a position of becoming eminence in the world of trade. Very truly yours,

(Signed) WARREN G. HARDING

Mr. Walter M. McFarland,
29 West 39th St., New York, N. Y.

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"American Marine Week" and the Marine Exposition Arouse Popular Interest in Merchant Marine

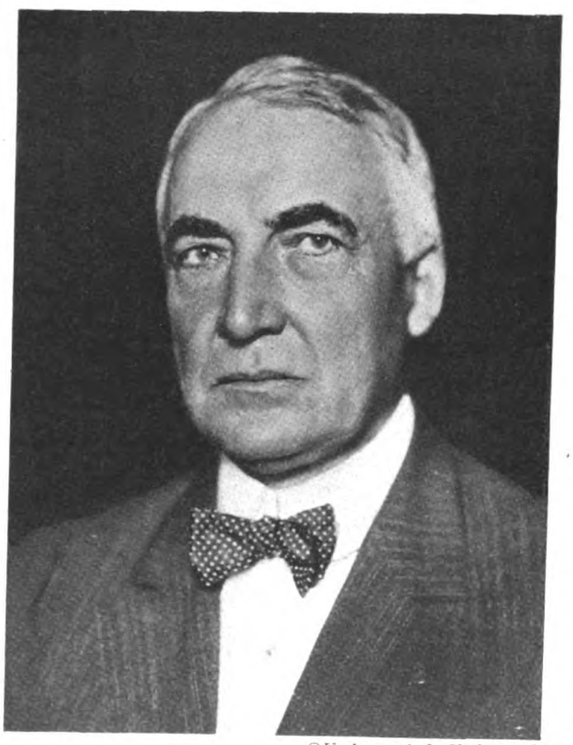
Secretary Denby Delivers Message from President Harding at Naval Architects' Annual Banquet Urging Support for Shipping

FROM the opening at eight o'clock Saturday evening, November 4, until the closing hour on the following Saturday evening, November 11, American Marine Week at the Grand Central Palace, New York City, was one continuous session of business, technical and social events. Practically every organization in the marine field was represented at at least one function and, from the President of the United States down to the men who man our ships, sincere and enthusiastic support was freely given.

The outstanding new feature of the week was the informal conference on "Standardization and Simplification," which was held in the Auditorium, Exposition Hall on Friday, November 10. About 100 delegates from maritime associations and societies, Government departments, and others interested in this subject from the shipbuilding, equipment manufacturing or ship operating companies were present.

Secretary Hoover Interested

Secretary Hoover is very much interested in the avoidance of waste in all industries and under this subject standardization and simplification play a most important part. The Secretary was unable to attend but was personally represented by Mr. R. M. Hudson, Division of Simplified Practice, Department of Commerce.



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President Warren G. Harding

In opening the conference Col. E. A. Simmons, president of the American Marine Association, explained the attitude of the Department of Commerce. The point of view of the Department is, according to the words of Mr. Hudson, that the one thing which must be avoided in the promulgation of this subject is any inference that the Government is trying to interfere or assume the direction of proceedings, a matter which is thoroughly one of self-determination for the industry. "We want to cooperate and gladly place all our facilities at the disposal of the group, if it desires to work out a program of simplification and standardization."

It is only fair to say, however, that the Department of Commerce has been of great assistance to the industries along these very same lines and has made it possible for them to secure beneficial results.

Object of Meeting

It is hoped in this country that we may accomplish what the British Engineering Standards Association has been working on for the last four years. This work was initiated in Great Britain in 1918 by the Board of Trade. Actual work was started in March, 1919, by the formation of two committees, one on ships' fittings and one on ship machinery details. During the meetings, which were held periodically, of the sub-committees formed covering the various sections or "panels" having to do with practices in defined districts, representatives from the Admiralty, the Board of Trade, Lloyd's Register of Shipping, the British Corporation, leading marine equipment companies and representatives from the foremost British shipping companies, assisted in the discussions.

Mr. Hudson's Paper

The paper read by Mr. R. M. Hudson at the meeting covers the objects to be realized and is published in full on page 746 of this issue.

The interest in standardization shown by all of those present was of a very practical nature. Every one expressed a complete willingness to cooperate in any way possible in the furtherance of this important undertaking. A motion was presented and passed that a committee of five or more individuals be appointed by the Chair to investigate ways and means for accomplishing the desired results of standardization.

The opinion was freely expressed after the meeting by prominent naval architects and other representatives that this was one of the most practical steps which has been undertaken in the marine field. With this in mind, the fullest co-operation may be expected from individuals throughout the shipping and shipbuilding industry. Mr. Carl E. Petersen, naval architect of the United States Lines, expressed the following comment:

"The present period of depression is an opportune time in which to make a concerted effort to bring together the principals concerned and endeavor to establish shipbuilding standards; in a moderate way first, followed later on by a larger scale. The factors making for successful effort in this direction would include (a) full representation, (b) an agreement of the principals to abide by the findings, and (c) provision for modification of the standards when necessary in order to insure progressive standardization."

The Marine Exposition

As to the Exposition itself, the pictures of the booths illustrating this article speak for themselves. It was a great show, giving everyone an opportunity to inspect the products of all branches of the marine industry. Speaking of new devices and new products, this exposition easily led all previous events in both number and variety. It was difficult to cover them all in the November and December

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issues of the magazines and in the Daily Bulletins that were issued during the week.

The best indication of the success of the show is that at this writing over 50 percent of the available main floor space for the 1923 Exposition has been definitely taken or requested. The membership of the American Marine Association, which has staged the Exposition for the last two years, is composed of the companies exhibiting and is strictly on a co-operative basis. Before the exhibitors got together and formed this association, outside parties had control and used the shipbuilders and manufacturers of those things with which ships are equipped as a vehicle through an exposition of this kind for making money for themselves.

The various marine organizations now realize that their own selfish interests demand a much greater participation in all that concerns the welfare of the American merchant marine. And it is also due to this realization that a far larger number of shipping and shipbuilding men attended this exposition than any previously held. The total attendance over and above the naval architects and marine engineers who were given special invitations amounted to 42,600.

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Herbert Hoover, Secretary of Commerce

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Albert D. Lasker, Chairman, United States Shipping Board

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Edwin Denby, Secretary, United States Navy

Opening Night

The exposition was formally opened at eight o'clock November 4 by Col. E. A. Simmons, while at the same time the Commandant of the Brooklyn Navy Yard, Rear Admiral C. T. Vogelgesang, delivered an address which was broadcasted from the W. E. A. F. station. A concert was given by Todd Shipyards Corporation Marine Band.

Col. Simmons in referring to the last "American Marine Week" said in part:

"At that time the international conference on the reduction of naval armaments was in session in Washington. To our minds the result of that conference showed the necessity for still greater activity inasmuch as it was clear that our national safety would demand an increase in activity in the merchant field at least equal to the forced drop in the operations of our Navy. We are still of that opinion; and that fact, plus the commercial aspect, has stimulated our efforts, resulting in this great Exposition and the events of the coming week. Is it not significant that substantially every organization in the marine field is now co-operating with the American Marine Association that no stone may be left unturned to make the gravity of the situation known to every citizen in the hope that the nation will awake before it is too late."

"We must keep our Navy up to the highest standard of efficiency and we must buttress it with a merchane marine," declared Rear Admiral Vogelgesang in his address over the radio. "To deny a subvention that will give our merchant marine an equal chance with that of other nations is to stultify the development of one of the greatest factors that will govern our future prosperity economically, and our future national security."

Navy Night

Navy Night was fittingly observed on Monday evening, November 6. A large number of naval men were present, including Admiral Vogelgesang, commandant of the Brooklyn Navy Yard, his staff and many other officers. Just before Captain R. D. White mounted the platform to address the Exposition, the country's flag and the Admiral's ensign were broken out while the Brooklyn Navy Yard Band played the "Star Spangled Banner."

Captain White delivered a very stirring speech, appealing for an adequate merchant marine to go hand in hand with an adequate Navy. Referring to the merchant marine, Captain White said in part:

"It is only in recent years that far-sighted businessmen in the United States have begun to turn their eyes abroad for opportunities to invest their money and apply their talents. Now, the richest opportunity that appeals most to American imagination is the wealth that lies in the seagoing carrying trade.

"We are late in seeing this opportunity but see it we must, for that is the vital problem facing us at the present time. It is only fair that we should carry, and profit thereby, our just proportion of our own commerce.

"Many obstacles beset our accomplishment of this end. These are too well known to shipping men and, for that matter, to the American public for me to enumerate them here, only permit me to say that the rum question is one of the least.

"But there is one to which I cannot fail to call your attention without failing in a duty I owe to you and to my calling, and that is the necessity of support for an adequate naval force to protect such merchant fleets as may fly our flag. History teaches us that no nation has ever become great or remained great upon the sea unless possessed of and utilizing to its full advantage an adequate efficient Navy."

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C. H. Potter, President, Maritime Association of the Port of New York

Col. E. A. Simmons, President, American Marine Association

W. M. McFarland, President, Society of Naval Architects and Marine Engineers

GOVERNMENT RADIO INSPECTOR EXPLAINS WIRELESS COMMUNICATION

At 3 o'clock Tuesday afternoon Arthur Batcheller, chief radio inspector, Second District, Department of Commerce, delivered to an attentive audience in the auditorium of the Grand Central Palace, a most interesting and instructive address on "Radio Communication," illustrated by films and lantern slides. He explained some of the fundamental technical principles upon which radio communication is based and reviewed briefly the United States laws and international treaties relating to radio communication. In addition he described the important part that the Radio Inspection Service of the Bureau of Navigation of the Department of Commerce plays in the orderly operation of this indispensable agency of national and international commerce. Many interesting facts were brought out in the statistical data given, showing the wide range of activities covered by official, commercial and amateur radio installations.

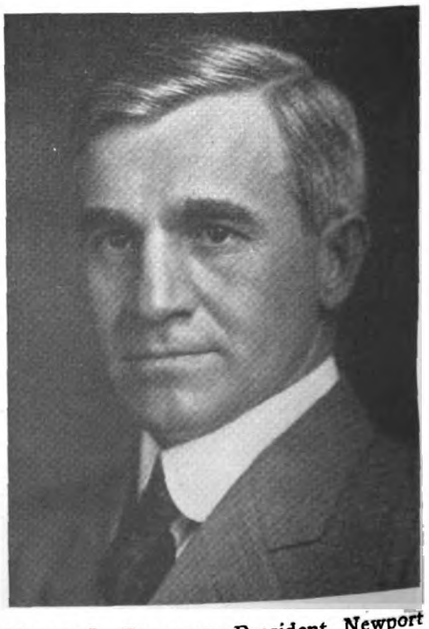
A BIG SMOKER

On Tuesday evening a large smoker was given by the Ocean Officers' Conference in the auditorium of the Grand Central Palace which was presided over by Mr. William Murray. A very interesting program, consisting of motion pictures, vaudeville and addresses was enjoyed by masters, mates, pilots, engineers, radio telegraphers and their friends. The Tidewater Oil Company furnished every one with a pipe and a can of tobacco.

Mr. F. V. Smith of the General Electric Company gave a very interesting lecture on "Ship Propulsion" and told what the General Electric Company had done in developing the electric drive.

H. H. Raymond, President, American Steamship Owners' Association

J. L. Ackerson, President, Atlantic Coast Shipbuilders' Association



Homer L. Ferguson, President, Newport News Shipbuilding Company

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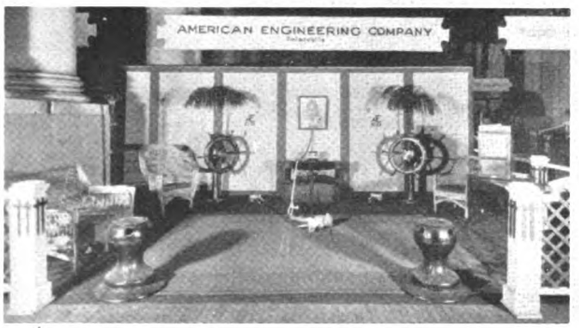

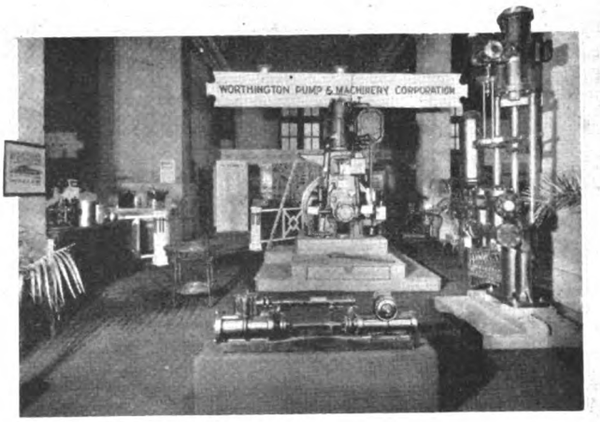

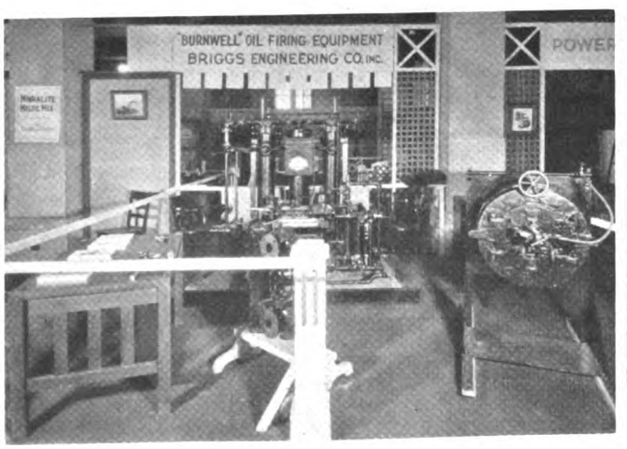

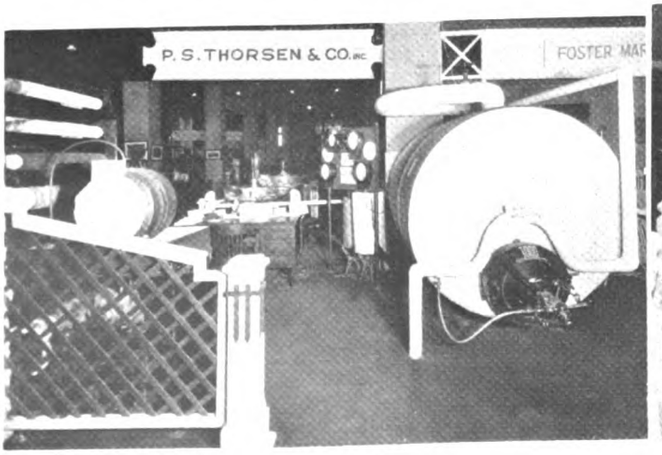

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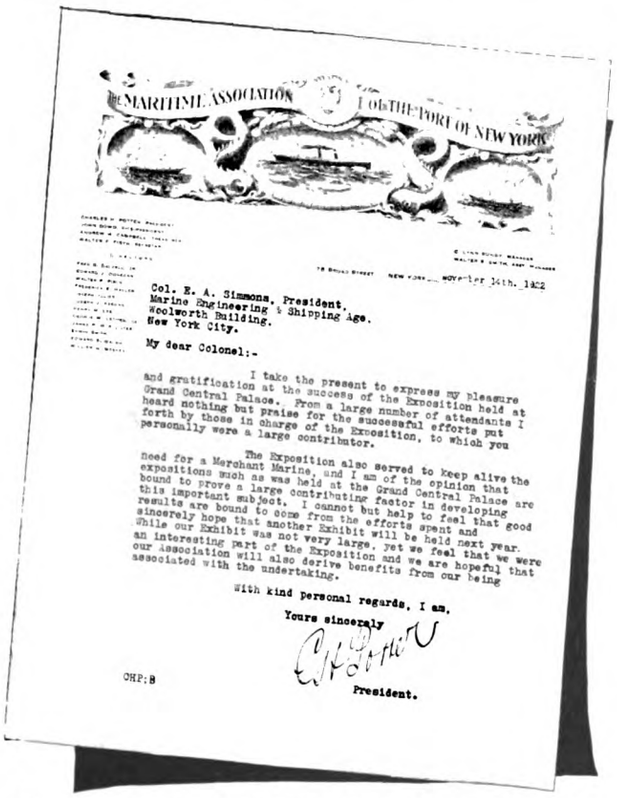
Captain John F. Milliken of the Neptune Association spoke about the wages that would have to paid to competent officers on American ships in order to prevent them from taking positions on shore. Mr. Samuel Lamont spoke on "Thrift." The Sperry Gyroscope Company furnished a moving picture entitled "The Romance of the Gyro."

Convention of Naval Architects and Marine Engineers

On Wednesday and Thursday the Society of Naval Architects and Marine Engineers held their thirtieth annual convention in the auditorium of the Exposition Hall, Grand


THE MARITIME ASSOCIATION OF THE PORT OF NEW YORK

November 16th, 1922

Col. E. A. Simmons, President,
Marine Engineering & Shipping Age,
Woolworth Building,
New York City.

My dear Colonel:-

I take the present to express my pleasure and gratification at the success of the Exposition held at Grand Central Palace. From a large number of attendants I heard nothing but praise for the successful efforts put forth by those in charge of the Exposition, to which you personally were a large contributor.

The Exposition also served to keep alive the need for a Merchant Marine, and I am of the opinion that expositions such as was held at the Grand Central Palace are bound to prove a large contributing factor in developing this important subject. I cannot but help to feel that good results are bound to come from the efforts spent and sincerely hope that another Exhibit will be held next year. While our Exhibit was not very large, yet we feel that we were an interesting part of the Exposition and we are hopeful that our Association will also derive benefits from our being associated with the undertaking.

With kind personal regards, I am,

Yours sincerely

OHP:B

President.

President of Maritime Association Indorses the Marine Exposition

Central Palace. These meetings are fully reported on pages 771-780 of this issue.

The annual banquet of the Society of Naval Architects and Marine Engineers, which was held at the Waldorf-Astoria, taxed the capacity of the grand ball room. Tables were placed all around the balcony and out into the reception room. Captain Walter M. McFarland was toastmaster of the banquet and also read the letter from President Harding which appears on page 756.

Secretary Denby's Address and Message from the President

The chief speaker of the evening was the Hon. Edwin Denby, Secretary of the Navy, whose address was enthusiastically received and applauded. Secretary Denby left no doubt in the minds of his audience that the Administration was determined that the Navy should be kept equal to that of any other country and that it would do everything in its power to establish the American merchant marine on a firm basis. Part of his address follows:

"A Navy as large as any other is the best security against war as well as the surest guarantee that if war comes it will be waged successfully by our country. If people could only realize that in a peace-loving Republic like ours which has no aggressive designs in the world, a reasonable preparedness is not alone our surest guarantee of peace but it is a duty we owe to humanity. A proper Navy does not mean aggression but it does mean the exact reverse. As a nation we have too frequently acted as did the village council which solemnly resolved that the volunteer fire apparatus should be put in a state of repair and well furnished twenty-four hours before each fire.

Merchant Marine Support Necessary

"Fine as it is, the Navy cannot properly function in time of war without other aid. Napoleon once said that an 'army travels on its belly,' meaning that it must have its supplies and its train or it could neither move nor fight. Exactly the same thing is true of the Navy. It cannot fight in distant waters nor travel without its supplies—its fuel ships, its refrigerator ships, its hospital ships, its repair ships, its mother ships for the smaller craft. It would be a vast expense in time of peace to maintain as naval craft only the great fleet that would be needed when the call to battle comes. We have been compelled to rely upon the merchant shipping of the United States to secure in large part these vitally necessary adjuncts to the fighting fleet.

"When President Roosevelt made that splendid experiment of sending twelve battleships around the world, I think he had more motives in mind than one. Among other things, I think he wanted to show the American people the vital need of the merchant marine. Those 12 ships could not have gone around the world or to any distant waters in time of war. We had not the necessary auxiliaries nor the necessary merchant vessels of which auxiliaries could be quickly made and so we chartered foreign shipping and the American armada was made possible by the use of vessels flying foreign flags. It was a striking demonstration of the military need of a merchant marine.

"Yet a more striking event occurred during the Spanish-American War when it was found almost impossible to assemble together enough ships to carry a force of 25,000 men to Cuba. And I well remember how we who were in the Navy then prayed that no wind might blow nor seas rise while these old vessels carried their precious cargoes to the scene of war. This too was because we had no merchant marine worthy the name and only gathered in by hook and by crook enough vessels to actually take the troops that short summer cruise. Had the war been more distant, the season different, and the weather inclement, a pitiful disaster might have befallen the American arms. We of the Navy regard the continuance of our present merchant marine and its increase as a vital necessity for the national defense.

The Country Is Awakening

"I am happy to say there seems to be an awakening now in the United States and it is my earnest hope and belief that that awakening will stir us to pass through Congress at the next session a bill which will encourage and make possible the building and operation of American ships by the employment of the only method we have at present—a subsidy. It will be a subsidy of so peculiar character, however, that it is to be expected that vessels receiving it will in the course of not many years be able to pay back into the treasury all the money advanced by the United States to aid in their operation and I am very happy to tell you what you doubtless know already that the recreation of the American merchant marine is a policy very dear to the heart of the President of the United States. His utterances have shown how earnestly he will endeavor to secure legislation at the special session of Congress, which he has just called for November 20, to keep the flag upon the high seas and to aid the merchants of the United States in their coming struggle for their fair share of the trade of the world. I am authorized by the President to read to you a message of greeting and encouragement."

This message appears on page 756.

Mr. W. J. Love, vice-president of the Emergency Fleet Corporation, gave some very interesting facts comparing our position on the sea in 1916 versus 1922. Extracts follow:

"The entrance of our country into the World War in April, 1917, found our shipping in a deplorable condition, at least with respect to world wide cargo trading, and my entire remarks are on this basis, that is, excluding services to contiguous countries, to the West Indies and Central America. A brief description will be helpful.

Review of Shipping

"On the Pacific there were, I think, only two American flag steamers trading to the Orient—the *China* and the famous *Minnesota*—and those to Australia via our South Sea Island possessions, the old established Pacific Mail Company service to the Orient having disappeared about a year previously.

"There were perhaps eight or ten ships under our flag trading to Central America and the West Coast of South America.

"Off the Atlantic Coast we had the American Line to South-

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ampton, and one or two passenger ships to Antwerp. The Atlantic Transport Company was using the recently acquired ships of the Pacific Mail in its London trade.

"The splendid fleet of the American Hawaiian Company was principally engaged in the Intercoastal trade and to the Hawaiian Islands.

"The fleet of the United States Steel Company was in its infancy, they having a few steamers trading with their products and general cargo in various directions.

"This will give you a fair picture of the activities of American ships in world commerce prior to the war.

DEVELOPMENT SINCE 1917

"Let us now look at what has been done in the development of privately owned lines since 1917. On the West Coast there are two passenger trading ships transpacific, two leading to Australia, and perhaps a dozen cargo steamers to the Orient, Central America and South America. On the Atlantic, we have two excellent services to German ports, and one of our largest manufacturing concerns has increased its fleet to well over 40 bottoms that cover many important trade routes.

"The Intercoastal trade, which is a restricted one, is absorbing today between 600,000 and 700,000 tons of the best American ocean-going cargo ships. Of course, this tonnage would be available in time of war for any service it might be called upon to fulfill.

"This comparison, therefore, of our position in 1916 vs. 1922, is anything but a pleasant one, for it shows that so far as privately owned shipping is concerned we have made little or no progress in developing services to move our exports or imports in world-wide trading. If it is the country's wish that we have a merchant marine then it can only be successful in private hands who will by energy, ambition, and resourcefulness, if proper laws are enacted, place it in a position to compete freely with the flags of other nations. While it is true that many maritime nations operate ships under restrictive laws, as a rule owners are generally free to take advantage of every means at their disposal to reduce costs of operation to the lowest possible point, and this during periods of depression simply means 'the survival of the fittest.' Are we headed that way, or are we headed the other way? Countries whose laws are too harsh reflect this lack of commercial freedom in the size of their commercial fleet."

PAY NECESSARY COST

Homer L. Ferguson, president of the Newport News Shipbuilding & Dry Dock Company, spoke as follows:

"Conditions have changed to such an extent in recent years that it is difficult to see how American papers and American men can be against all laws that will foster the development and growth of the merchant marine.

"We live in a protected country and that our marine must be protected seems proven both by reason and experience.

"Discriminating duties as provided by the law of 1920 having been declared by two Presidents to be out of the question at this time, we are forced to consider the recognized alternative of subsidy.

"We paid so much for lack of merchant vessels during the war that any reasonable cost for subsidy appears trivial by comparison.

"The necessity for merchant vessels, particularly of large fast types, was such as to demonstrate their usefulness to be on a parity with that of war vessels.

"The limitation of capital naval ships further emphasizes the value of merchant ships, and inevitably transfers the competition from what may not be built to what may be built. The 5-5-3 ratio can only be maintained by providing in practically that ratio all of the necessary elements of naval power including merchant shipping suitable for carriage of troops, and capable of conversion into auxiliary cruisers.

"Otherwise, it follows, we will be left behind and not only will our shipbuilding decay and our shipping industry fade away to its former insignificance, but our position in the world will have been given away without the people knowing it.

"How can anyone believe in the national necessity for an effective merchant marine and not believe in paying what is necessary

View of Center Aisles, Marine Show, Grand Central Palace, November 4-11, 1922

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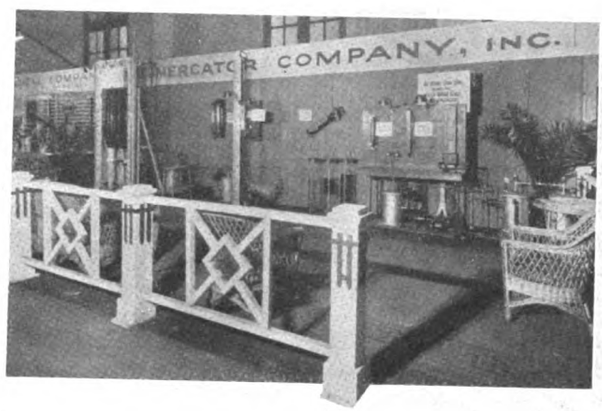

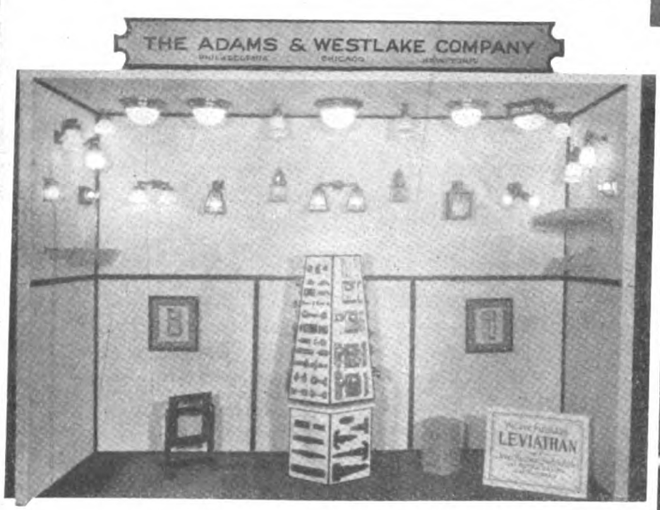

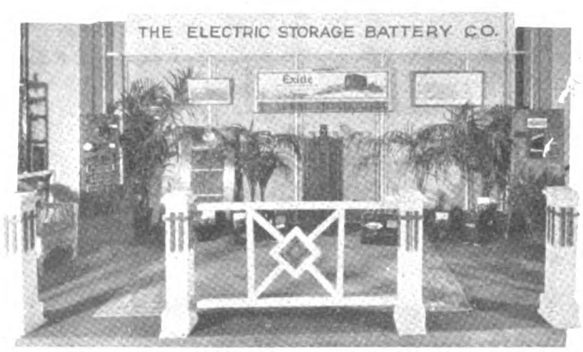

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to get it? How can anyone believe in preparedness and in a proper Army and Navy and not believe in providing that great and necessary auxiliary to each—an effective merchant marine?

"Every sound argument for preparedness applies equally well. Free traders and those who believe the earth is rid of wars, will generally oppose doing anything to provide our country with such a prime necessity as a merchant marine. The costly experience of the past few years is lost on them. But our trade and our policies will not always be dominated by others and some day we will share in fair partnership on the sea with the other great nations."

American Marine Association Holds Annual Meeting

The annual meeting of the American Marine Association to discuss the work of the year, the success of the exposition and the reports of committees and finally the election of new officers, held in the Auditorium of the Grand Central Palace, Friday afternoon, was opened at 4:30 o'clock with Col. E. A. Simmons presiding.

In his opening talk the president outlined informally the original purpose for which the association was formed, the gradual development of its powers and broadening of the scope of its activities until it has reached the point this year when over eighteen associations actively engaged in the marine field have been interested in making American Marine Week a success.

With reference to the development of the association and its future possibilities, Colonel Simmons outlined the proceedings of the informal conference on standardization in ship construction and ship operation held in the auditorium that morning and referred to the proposed plan to subdivide the American Marine Association into several parts, such as designing, engineering, purchasing, etc., each part to co-operate with other existing organizations to the end that during the year papers on various subjects would be prepared for presentation and discussion at next year's meeting.

In concluding his address, Colonel Simmons thanked Vice-President Wampler and the members of the several committees, through their respective chairmen, for their tireless energy and splendid co-operation, attributing to them the success of the show and the activities connected therewith.

Following the report of the Secretary, the President called for the report of the Nominating Committee. He explained that while the by-laws provided for the selection, as well as the election, of members of the Executive Committee for the several districts by the members having their offices in those districts, the Nominating Committee had taken it upon itself to recommend men to fill existing vacancies and to provide for vacancies which would occur at the end of the year through expiration of terms of office—the reason being that the Nominating Committee consisted of men from all six districts able to canvass the situation in advance. It was then decided that the representatives from the several districts would act on any recommendations so made by the Nominating Committee. The result was that the following were elected:

District 1. New England States—Charles F. Scott, General Electric Company.

District 2. New York and New Jersey—William Wampler, Ellcon Company; L. H. Korndorf, Federal Shipbuilding Company.

District 3. Pennsylvania, Maryland, Virginia, etc.—James Plummer, Newport News Shipbuilding & Dry Dock Company.

District 4. Gulf States—Ernest Lee Jahncke, Jahncke Dry Docks, Inc.

District 5. Middle West and Great Lakes States—F. C. Bradbury, Crane Company; W. S. Doxey, *Marine Review*.

District 6. Pacific Coast States—H. F. Alexander, Pacific Steamship Company; J. J. Tynan, Bethlehem Company.

Through recent amendments to the by-laws it was necessary to elect two officers only, selection of a Secretary and a Treasurer being left to the Executive Committee. The report of the Nominating Committee recommended the re-election of Colonel E. A. Simmons, of Marine Engineering and Shipping Age, New York, as President, and the election of Frank J. Shipman, of the Texas Company, New York, as Vice-President. They were then elected unanimously.

There was some expression of surprise that William Wampler, of the Ellcon Company, had not been re-elected Vice-President. The fact is that the office was tendered to him by the Nominating Committee and Mr. Wampler declined only because of his inability to give to the affairs of the association the amount of time required.

Maritime Association Day

Saturday, November 11, was Maritime Association Day and Armistice Night. In the afternoon Captain John F. Milliken of the Neptune Association gave an interesting talk on the part that the sea-going personnel had played in the history of our country. Captain Milliken pointed out that during the Revolutionary War the number of sailors on our men-of-war, privateers and merchant ships exceeded in number those in General Washington's Army. He also said that we had more men on the sea than in the Army in the War of 1812.

The Coast Guard

A paper explaining the duties of the Coast Guard, which was prepared by Commander B. L. Reed, was read by Captain Yardell. Commander Reed said that "While the Coast Guard is a military service available for active duty in time of war under the Navy Department, its prime duties are humanitarian, and, in general, have to do with rendering assistance to vessels in distress and saving life and property; destruction or removal of wrecks, derelicts, and other floating dangers to navigation; extending aid to American vessels engaged in deep sea fisheries; protection of the customs revenue; enforcement of law and regulations governing anchorage of vessels in navigable waters; enforcement of laws relating to quarantine and neutrality; suppression of mutiny on merchant vessels; enforcement of navigation and other laws governing merchant vessels and motor boats; enforcement of law to provide for safety of life on navigable waters during regattas and marine parades; protection of game and the seal and other fisheries in Alaska; enforcement of sponge-fishing law; the conduct of the International Ice Patrol for safety at sea off the Grand Banks.

Other papers prepared for the American Marine Week appear elsewhere in this issue.

Electric Drive Control Panels

TWO types of electric ship propulsion control panels for turbine and Diesel electric drive were features of the General Electric Company exhibit at the Exposition.

The steam turbine drive control panel was built for the San Francisco-Oakland Terminal Railways. The propulsion equipment with which it is to be used consists of a direct current turbine generator with exciters. The generator is connected to the turbine through single reduction gears. Two motors drive the propellers, the bow motor being run at such a speed that no work is done by its propeller. The astern motor develops 1,100 shaft horsepower.

The Diesel electric control panel on exhibition was a duplicate of that used on the *Golden Gate* in conjunction with the two Diesel engine driven direct current generators driving two motors. The astern motor in this case develops 750 horsepower. This control panel contained the switches for the three control stations; one station in the engine room and one in each pilot house. These switches are so arranged that only one station can be used at a time.

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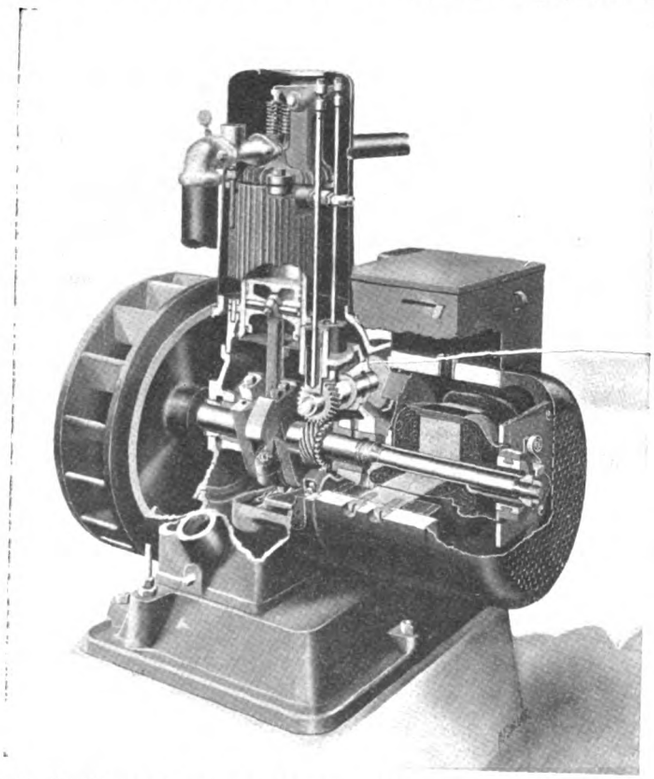
New Devices Exhibited at the Marine Exposition

Marine Light and Power Plant

TWO small marine power plant units recently put on the market by the Westinghouse Electric & Manufacturing Company, New York, were exhibited at the Exposition. These units of 1½ horsepower and 3 horsepower, respectively, are suitable for supplying the necessary current for light and power for auxiliary equipment on small yachts, cruisers and other pleasure craft. They are equally applicable to auxiliary or emergency service on larger ships for signal and deck lights as well as supplementary power in case of accident to the main generating equipment or when the vessel is in port.



Westinghouse Type E-30 Light and Power Plant, with 750-Watt Generator and 4500-Watthour Battery (8 Hour Rate).

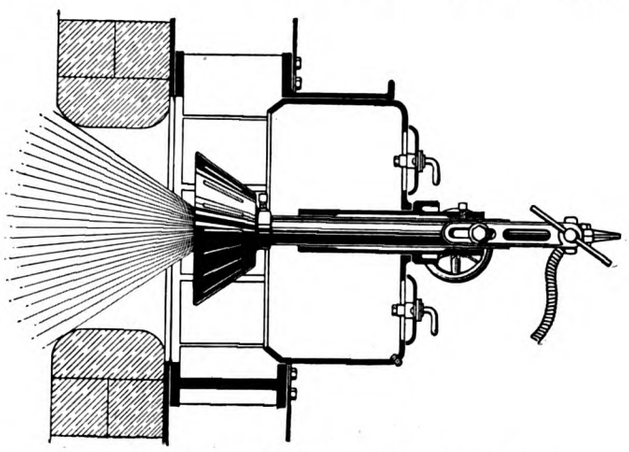
The smaller outfit is driven by a 4-cycle, single cylinder, air-cooled engine, operating on either gasoline or kerosene and runs at 1,250 revolutions per minute. The weight without the battery is 338 pounds. The generator output is 750 watts.

The 3 horsepower unit is run by a similar type engine at 1,200 revolutions per minute and weighs 485 pounds, while the generator output in this case is 1,500 watts at 30 volts.

Batteries supplied with the equipment are of 4,500 or 6,000 watt hour capacity with a weight of 600 pounds for the former and 904 pounds for the latter.

Swinging Front for Oil Burners

THE Bethlehem (Dahl) mechanical oil burning equipment has been improved by the new swinging front which may be used with both natural and forced draft. This new front combines all the features of the regular burners, including the slotted cone, the nine vane air register and hand ratchet adjustable pot air valve. Probably the greatest advantage claimed for the new front is that access to the furnace may be made without taking down the front. The front may be swung aside by simply moving two dogs and removing one lock pin. The front half of the pot swings open with the front itself, leaving the vanes of the air register locked, so that in the case of forced draft any one of a battery of furnaces may be opened without interfering with the draft in the others.



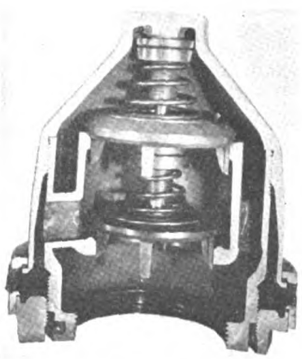
Improved Type of Bethlehem (Dahl) Oil Burner

Cone adjusting handles have also been added and a peep hole cut in the slotted cone which lines up with a peep hole in the door so that the operator can observe the flame at the burner tip from in front of the furnace.

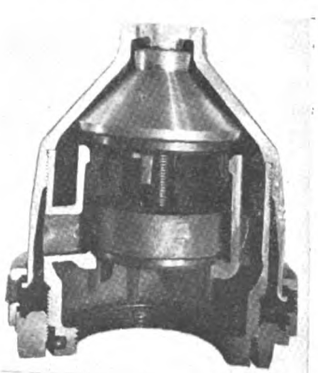
Three Luckenbach ships which are being equipped with the largest Scotch marine boilers ever built are being fitted with this new type front—forty-eight furnaces in all.

Automatic Tank Vent Valve

THE exhibit of the William Cramp and Sons Ship and Engine Building Company, Philadelphia, Pa., included among other devices the de Krafft automatic tank vent valve, designed for use on the vent pipes of oil tanks so that in case of accident, such as a collision or grounding, where a tank is punctured and there is danger



Adjustment with Springs on Disks



Adjustment with Weights on Disks

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of it filling with water, the valve may be quickly closed, completely stopping vent pipes and preventing the escape of the air from the tank and the water from entering it.

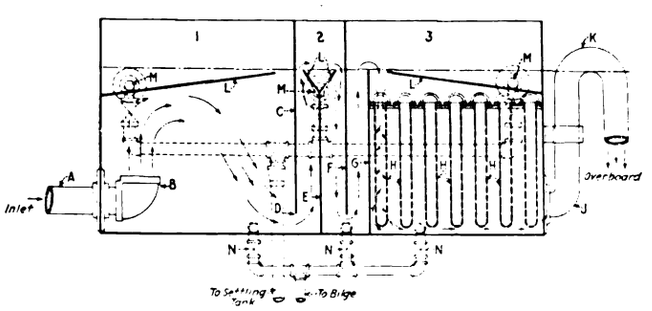
In the device there are two separate valve disks seating on separate seats instead of one disk being seated upon the other. Both of the disks open upward and close downward by gravity instead of one disk opening downward and being held in its place by a spring; the danger of this disk falling open through accident to its spring thus being avoided. The pressure at which it is desired to have the disks operate may be controlled by springs or by means of weights. A wire net screen around the bottom is provided which prevents dirt from entering the valve and acts as a protection against fire. This screen also serves as an indicator to show whether the valve and vent pipe are open or closed.

When the tank is being filled and a pressure is caused in it, the lower disk lifts and the air escapes through the ports and the screen into the air. While the tank is being emptied, a vacuum is caused in it, the air in this case entering the valve through the screen and the ports to the chamber over the lower disk, lifting the upper disk and flowing into the tank through the passage between the ports.

This valve has passed a series of severe tests by the United States Navy Department, and is approved by Lloyds' Register of Shipping, the American Bureau of Shipping, the United States Salvage Association and others.

Bilge and Ballast Oil Filter

FOR the prevention of pollution in harbor waters by the discharge of ballast and bilge water from oil-burning vessels the Todd Shipyards Corporation has developed a filtering system which was exhibited for the first time at the Marine Exposition. The system consists of moving water by gravitation and filtration by passing the



General Arrangement of Todd Bilge and Ballast Filter Tank

overboard discharge from the bilge and ballast pumps through a specially constructed filter.

The main body of the filter consists of a rectangular sheet metal tank located at any convenient point above the load water line of the vessel. This tank is subdivided into three or more ompartments, designated in the accompanying illustration as 1, 2 and 3. The overboard discharge, consisting of water and oil, from the pump enters the filter tank through pipe *A* into compartment No. 1 and is deflected upward by elbow or bend *B*. Compartment No. 1 being relatively large, acts as a reservoir, and this permits the major portion of the oil contained in the discharge sufficient time to flow to the top of the level in this compartment.

The flow from compartments 1 to 2 is baffled by a division plate *C*, which is open on the bottom only at *D*. Compartment 2 is also fitted with a division plate *E* which forces the water to flow up over it and down behind a third division plate *F*, which is similar to *C*, and separates compartments 2 and 3. The flow of water under and over these baffles permits the oil to rise to the top, due to its lighter gravity, and the final flow into compartment 3 over baffle *G* is relatively free from oil. The water is then passed through filtering cloths *H*, and these cloths entirely eliminate the final particles of oil. It is then carried overboard through pipe *J* and return bend *K*.

Each compartment is fitted with a skimming pan *L* and drain cocks *M*, whereby the oil which floats to the top of the various compartments can be drained from the filter into a settling tank. Each compartment is also fitted with a clean out valve *N*.

Fireroom Temperature Reduced with New Air Register

A FEATURE of the Coen Company, N. Y., exhibit was the air register similar to the type which was developed for installation on the S. S. *President Taft* of the Pacific Mail Steamship Company.

A unique method of obtaining full air openings in the vane wheel has been devised. This wheel slides into position on double threads. Ready access to the interior of the furnace may be had through the front, which is hinged and may be swung aside without the necessity of dismantling any of the parts.

The fireroom records of the *President Taft* on a trip to Japan indicate that the air registers operated satisfactorily, maintaining an average fireroom temperature for the voyage of 90 degrees F., whereas with the former equipment the average temperature was 120 degrees. The air registers on this ship are fitted to Yarrow boilers.

New Balanced Window Sash

AN ingenious window sash just perfected by O. M. Edwards, Inc., Syracuse, N. Y., was among the new devices shown at the exposition. The window is balanced by a spring actuated mechanism consisting of two levers with rollers at the outer ends upon which the glass rests. Balancing is accomplished by a compression coiled spring with arrangements for adjustment to correspond with the weight of the glass. All of the mechanism is located above the sill, which prevents the accumulation of water and consequent rusting of the mechanism.

Four Soundings a Minute with New Device

THE "Marimeter," patents for which are controlled by Wm. Cramp & Sons Ship and Engine Building Company, was demonstrated at the Exposition by the inventor, Samuel Spitz. The principle on which the device operates is measurement of the time interval between the moment a blow is struck on the ship's bottom by an electric hammer until the echo is reflected from the sea bottom and transmitted back through the water and picked up by a microphone on the ship.

The equipment includes a pedestal located on the bridge, on which is mounted an electric keyboard and an indicator. Microphones are placed on the ship's bottom, on either side of the hull and at the bow. As noted, when a key is pressed a sound is produced at the ship's bottom. Immediately the indicator needle starts moving from zero and continues until the echo is picked up by the microphone, at which instant it stops. The dial is calibrated in fathoms so that the sounding may be read directly.

The apparatus may also be used to determine the distance from one ship to another, to land, an iceberg or other marine

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menace. The Navy Department in testing the device has made soundings up to 28,000 feet, at the rate of four soundings a minute.

Sturtevant Sea Speed Engine

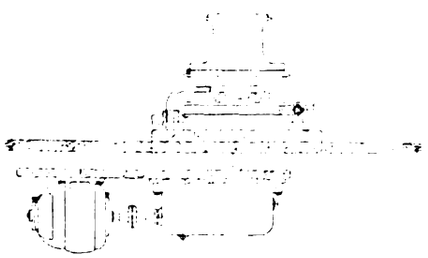
A LITTLE known product of the B. F. Sturtevant Company, Hyde Park, Mass., was exhibited this year—a 75 horsepower gasoline engine especially developed for speed boats.

This engine is of the 4 cylinder four cycle, water cooled vertical type with a bore of 4½ inches and a stroke of 6 inches. It is designed to operate continuously at a speed of 1,500 to 1,600 revolutions per minute. Right and left hand rotation designs are supplied so that a pair of engines may be installed symmetrically in a boat.

Electric Windlasses for Motor Boats

THE American Engineering Company, Philadelphia, Pa., in its exhibit featured small windlasses of the gypsey head and wildcat types especially developed for use on motor boats. The gypsey type unit is driven by a 1/3 horsepower weatherproof marine motor connected through a flexible coupling to the gearing of the gypsey head. The barrel of the windlass is of bronze 5 inches in diameter. The overall dimensions of the machine are: Fore and aft, 26 inches; thwartship, 11 inches; depth below deck, 8 inches; height of gypsey barrel, 7½ inches; weight, 100 pounds. This will lift a 200-pound anchor or loads on the barrel up to 1,000 pounds.

The gypsey barrel wildcat type windlass is equipped with either a 1/3 horsepower or ¾ horsepower weatherproof marine



Gypsey Barrel Wildcat Type Windlass

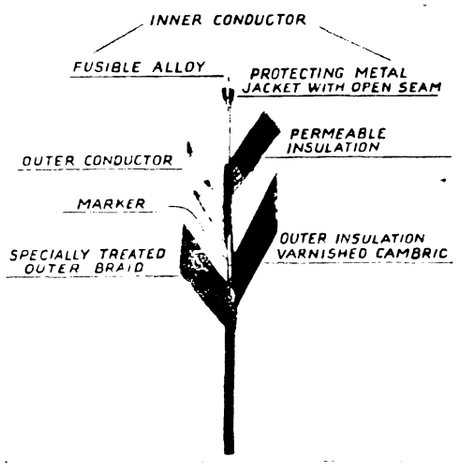
motor. The smaller motor will handle an anchor up to 150 pounds, while the larger will lift 300 pounds. The wildcat can be made to handle chain from ⅜ inch to 9/16 inch inclusive. A toggle operated self-contained brake is furnished also a deck pipe for the chain. The weight of the unit depending on the size of the motor is from 125 to 150 pounds.

Fire Detecting Wire Automatic Alarm System

A CLOSED circuit automatic fire alarm system depending upon the fusibility of a special type wire, known as "Fire Detecting Wire," was demonstrated at the exposition by the Fire Detecting Wire Corporation, New York.

The system on board a ship consists of various circuits of continuous thermostatic wire each connected with a centrally located control panel and with alarm gongs so that in the event of fire or even of undue heat in any of the compartments an alarm will be given before the fire has become dangerous. The construction of the wire is illustrated below. It is composed of a core of special fusible alloy covered with a protecting metal jacket having a narrow open seam. Next to this is a wrapping of saturated cotton yarn which provides insulation between the core and the outer conductor which is of spirally wound brass tape. A layer of varnished cambric protects against grounds and a varnished cotton braid over all gives mechanical protection.

The soft metal in the core has a fusing temperature of



Construction of Fire Detecting Wire

160 degrees F., but, because of the retarding effect, amounting to 20 degrees F., of the outer casing, the wire as a whole has a fusing temperature of 180 degrees, although in a slow heat the fusing point is reduced to approximately 160 degrees since the entire mass has time to become thoroughly heated.

In operation the soft metal core first becomes plastic, and at the instant of fusing spurts through the permeable insulation making electric contact with the outer conductor or brass tape. This contact operates the system and sounds the alarm.

An installation may be either code or non-code, according to requirements. In the code system single stroke gongs are placed at various points in the protected area. The fusing of the wire in any circuit will cause the code number for that section to be sounded on all gongs in the system. Each section is provided with an alarm box by means of which the system can also be operated manually.

In the non-code system each section of thermostatic wire is led to a centrally located control panel on which is mounted an indicator having a drop for each compartment. The fusing of the wire in any circuit shows on the indicator the section affected and rings a series of vibrating gongs located at various points in the protected area.

Features of Ice Machine Exhibit

AMONG the various types of ice machine equipment shown by Brunswick-Kroeschell Company, New Brunswick, N. J., was a new design of piston valve engine driving a 2-ton ice machine. The complete compression side of this machine was shown.

The engine is the latest type steam reciprocating engine developed for ice machine service, having in addition to the piston valve feature a channel frame which permits ready access to the connecting-rods and stuffing box.

One of the few direct motor driven ice machines was also shown. This unit consists of a 1-ton ammonia outfit driven by a 3 horsepower motor.

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As a result of the recent consolidation of the Brunswick Company with Kroeschell Brothers, of Chicago, a Brunswick-Kroeschell carbon dioxide machine was also included in the exhibit.

Measuring Liquids at High Temperatures

IMPROVEMENTS in the Empire fuel oil meter make possible the measurement of liquids at high temperatures. The standard type meter for measuring fuel oil on board ship produced by the National Meter Company, N. Y., will withstand a working pressure of 300 pounds per square inch and a hydrostatic pressure of 600 pounds per square inch. This meter has been approved by the United States Navy and in the reconditioning of the *Leviathan* nine meters are being installed.

Electric Telemotor Perfected

THE Hyde Windlass Company, Bath, Me., exhibited a new and original application of the induction principle to an electric telemotor. This telemotor has been developed at the company's laboratory recently in order to furnish a dependable steering apparatus for steamships.

By moving the steering wheel in the pilot house any angle of rudder is automatically obtained. This is a contactorless type telemotor having a positive follow-up. Only three small wires are required between the steering wheel in the pilot house and the steering gear aft. The telemotor was shown operating two types of electric steering gears.

Utilizing Waste Heat from Diesel Engines

REPRESENTATIVES of Row and Davis' Engineers, Inc., N. Y., took special interest in explaining a new steam generating outfit developed by the company for extracting heat from the exhaust of Diesel engine installations.

The steam thus generated is available for heating a ship and for such purposes as supplying steam to the RanD system for rendering fuel oil mobile, without the use of tank heating coils.

Two ships, the *City of Jacksonville* and the *Ashby,* are already equipped with the new steam generators.

Largest Brass Valve in the World

The Crane Company exhibited in its booth the largest brass valve ever made. This valve, which was built for the United States Navy, is a 39-inch gate type and weighs 4,600 pounds.

Protective Coating for Insulated Surfaces

WHEREVER magnesia and other insulating materials are used on boilers, tanks, feed water heaters, oil heaters and in other applications "Thorkote" a product exhibited by P. S. Thorsen and Company, 81 Coffey street, Brooklyn, N. Y., may be applied as a waterproof covering. This material is in plastic form when it is applied to the insulating covering. After application it becomes hard, but may be easily repaired.

The advantages claimed for "Thorkote" are the fact that it is cheaper than sheet iron, has insulating qualities itself, is waterproof, has no open seams, thus eliminating the chance for water reaching the magnesia, and cannot rust.

New Soot Blower Head

THE Diamond Power Specialty Company, Detroit, Mich., exhibited the model G-2M blower head designed especially for marine work, in restricted spaces. It has a minimum projection from the casing of a watertube boiler of 7½ inches. Special features include the stuffing box, packing gland, stop system and chain operation.

The front end blower for Scotch marine boilers also exhibited is designed for cleaning double end boilers where the space between the rear of the boiler and the bulkhead makes necessary the operation of the soot blower from in front of the boiler. The device is operated through the flue doors. No threaded parts of the blower are exposed to the steam.

Diesel Electric Drive

FOR purposes of illustrating the application of Westinghouse direct current motors and generators to Diesel electric ship propulsion, a complete model layout of a typical installation was shown in the Westinghouse booth. The electric equipment is adaptable to practically any make of Diesel or semi-Diesel type engine.

The features of electric drive especially emphasized by the demonstration are flexibility of the control which is based on the Ward Leonard system of operation, the fact that the most economical engine speed may be maintained at all motor speeds and that in case of trouble one unit may be cut out and repaired with only a slight reduction in the speed of the ship.

Casting Metals by the Centrifugal Process

A NUMBER of highly polished cylinders of cast bronze made by a new centrifugal method of casting nonferrous metals were included in the exhibit of the American Manganese Bronze Company, Holmesburg, Pa. Pump lines, bushings and gear blanks for marine work are cast almost to size, with a minimum of material left for finishing. The process consists in rotating specially constructed molds at a high rate of speed and pouring in the molten metal. The metal solidifies and forms the casting almost instantaneously. The assurance of homogeneous, close grained castings without flaws is claimed for the new process.

Submarine Signal Oscillator for Lightships

A NEW type submarine signal oscillator especially developed for lightship service was demonstrated at the Marine Exposition by the Submarine Signal Company, Boston, Mass. This new producer of submarine signals is a modified form of the Fessenden oscillator which is the most powerful generator of submarine signals ever devised. The new oscillator is much lighter than the Fessenden type, having substantially the same weight as the automatic bell now in service on light vessels.

The oscillator can be readily substituted for the bell on lightships and can be suspended from the davit now provided. The new equipment includes a rugged power plant which supplies the electrical energy required for the operation of the oscillator.

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Naval Architects and Marine Engineers Hold Thirtieth Annual Convention During American Marine Week

President of Society Says Passage of Subsidy Bill Will Benefit Whole Country—Abstract of Papers and Discussion

THE thirtieth annual convention of the Society of Naval Architects and Marine Engineers, which was held this year in conjunction with the Marine Exposition at the Grand Central Palace, New York City, was opened at 10:30 A. M., Wednesday, November 8, by Walter M. McFarland, president of the society.

Secretary-Treasurer Daniel H. Cox in discussing the record of membership in the society stated that this membership, which shows a total of 1,631 in all grades, is excellent but that the society under conditions in the industry will do well if these figures are maintained. The increased membership as a result of abnormal shipbuilding activity during and for a short time after the war could not be maintained, as many of those who were engaged in shipbuilding operations who became members of the society have now returned to former occupations and, as a result, have resigned from membership. A number of new members have been admitted to the society, however, and applications are being received so that the coming year will probably show no decrease in the rolls of the society. The secretary's report showed the financial condition of the society to be very good, with a substantial increase in the endowment fund for the past year.

Election of Officers

The following officers were elected for the terms indicated:

Honorary Vice-President—Joseph H. Linnard.

Vice-Presidents (for term expiring October 31, 1925)—Albert P. Niblack, Richard M. Watt, Charles P. Wetherbee, Harvey D. Goulder.

Members of Council (for term expiring October 31, 1925)—Charles A. McAllister, Theodore E. Ferris, Hugo P. Frear, W. L. R. Emmet, J. Howland Gardner, William J. Davidson.

Associate Members of Council (for term expiring October 31, 1925)—Albert G. Smith, George D. Ali.

Executive Committee—Stevenson Taylor, W. L. Capps, Andrew Fletcher, F. L. Du Bosque, J. W. Powell, H. L. Ferguson, A. G. Smith.

Committee on Papers—F. L. Du Bosque, J. H. Gardner, H. L. Aldrich.

Secretary-Treasurer—Daniel H Cox.

Assistant Secretary-Treasurer—Thomas J. Kain.

Abstract of President's Address

The question of supreme interest for all of us just now is the shipping bill. The vital element in this bill is the recognition of the duty of the Government to encourage the merchant marine, just as it endeavors to encourage other industries in the country by means of a protective tariff.

It is very gratifying to know that the earnest efforts made to educate the people of the country, particularly in the interior, have resulted in favorable action by Chambers of Commerce, Boards of Trade and other representatives of the citizenship of the interior. These will have very serious weight with their representatives in Congress.

The President has shown a strong personal interest in the matter and has gone on record as favoring Government help for our merchant marine. Under all these circumstances we have every reason to hope for favorable action by Congress with the resultant benefit to shipowners, shipbuilders and all who have any connection with the operation or building of ships. The passage of this bill will be of great benefit to the country at large by providing an outlet for the great amount of idle tonnage.

During the latter part of the war the class of vessels known as "transports" was designed of reasonably high speed and large capacity. The Government officials wisely called in help from some of the big operating companies in the design of these vessels, with the result that they were planned so as to be readily converted into passenger and freight steamers of the "liner" type. As a matter of fact, the end of the war came before any of them were finished, so they were completed for passenger and freight steamers. All of them are now in service and giving a very good account of themselves.

It is also very gratifying to note that a considerable number (about 150) of the vessels built at the three great fabricating yards have been in service almost continuously since they were built and reflect great credit on the yards for the record they have made.

For large powers and high speed vessels the geared turbine now seems an established favorite. In the case of cargo boats, such as the ones spoken of above, a great many installations have given complete satisfaction, and there is probably little doubt that with proper care and management they are entirely satisfactory. The reduced weight and greater economy due to this type of machinery certainly is a strong recommendation.

The very high thermal economy of the Diesel engine has brought it into very serious consideration in these days of the necessity to save at every point. A recent statement gives the number of motorships afloat at about 1,450, with about 180 under construction.

The use of oil as the fuel under boilers seems to increase steadily notwithstanding the predictions of a relatively early exhaustion of the oil fields. As long as the price is reasonable, the advantages of oil fuel are so many and so great that its increased use is to be expected.

The experience in the Navy with the electric drive on the new battleships has thus far been very satisfactory, a striking instance being that of the return trip of the *Maryland* from Rio de Janeiro to this city in September of this year, where, after steady running at nineteen knots for most of the trip, the speed was increased to the highest point, over 21 knots, for the last two days and everything worked admirably.

Another form of the electric drive where Diesel engines are used as the prime mover instead of steam engines is being tried out in some vessels of moderate size and power. The limitation of the Diesel engine to small powers per cylinder has, of course, thus far ruled it out of any installation of very powerful machinery.

Automatic Steering

By Elmer A. Sperry

Abstract

THE main points that influence holding a ship on her course under service conditions are the following:

1. The general characteristic of the ship, especially as to flow of water to the rudder and the disturbances of the water by nearby propellers.

2. The general effectiveness of the rudder, as such.

3. Whether the ship is light or loaded and, when light, if she is low at the stern with large areas forward exposed to wind effect.

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If automatic steering is to be of the greatest value in controlling the ship's course, one of its paramount objects must be to suppress helm. This fact alone emphasizes the importance of a guiding element that is instantly and minutely responsive, to be employed as a base line so that the slightest departure from the course may be utilized to apply the correction.

No magnetic compass can ever be relied upon to do this. Within the last ten years ways and means have finally been developed that prove that in the gyro compass alone, with its instantaneous response to minute deviations of course, we have everything that is necessary to accomplish the purposes most effectively, even including the easing off, meeting, and full anticipation.

Of course, in the case of the gyro compass it is not the master which is used direct. The repeater follows the master with an accuracy of one-twelfth of a degree. This minute accuracy of the gyro compass repeater gives opportunity for automatic steering never before possible.

The embodiment of the mechanism for automatic steering has been developed in two types, which may be known as the "separate" system and the "unit" system. In each case the steering wheel is in its ordinary position on the bridge. Either of these systems can be employed with any telemotor system, but the "separate" type is preferred where a telemotor is not employed.

Operation of the Automatic Quartermaster

The instrument is capable of being set for response to different amounts of deviation from course. It has been employed practically for continuous steering of very large ships, and its performance is illustrated by conditions where the response is set as close as ten minutes of arc or 1/6 degree of departure from true course in azimuth. This operation is positive in its nature and through the closing of an electric contact calls into action the rudder operating mechanism, which simultaneously establishes the helm angle. This, in turn, operates a suitable follow-up mechanism by adjustment auxiliaries effecting the proper anticipation, and the helm eased off and returned or swung to its proper complementary angle.

In a typical "unit" system the gyro compass repeater, located at the top of the pedestal containing the automatic mechanism, is provided with a handle which is used to throw the automatic device in and out of gear with the steering wheel. Near the top of the pedestal is located a small tiller wheel by means of which all changes of course are set. Adjustments are provided for steering with the least helm according to different conditions of the ship and weather. Any standard telemotor may be employed with either the "unit" or "separate" type equipment.

Discussion

R. H. Rogers, of the General Electric Company, outlined the operation of the "wake" type of automatic steering which is being developed by the General Electric Company. This system operates with a base line formed by means of a drag towed aft. As the ship tends to move from the direct line made with the drag, electric contacts bring motors into function which, through a suitable mechanism, act upon the tiller. In comparing the two systems, Mr. Rogers brought out the fact that the gyro system, by means of the compass, holds the ship's axis to some course that is manually adjusted by estimation from time to time so as to make good the desired course, while the "wake" system works solely to the course being made good as indicated by the wake and allows the ship's axis to take automatically whatever headings are necessary to prevent deviation.

The importance of an adequate system of automatic steering cannot be too greatly emphasized when it is understood that even at a small helm angle the rudder causes a tremendous drag on the propelling engines. When unnecessary deviations from course are prevented the saving in engine power is correspondingly great.

Commander Herbert S. Howard, C. C., U. S. N., stated that the Bureau of Construction and Repair of the Navy Department is very much interested in this matter of automatic steering and would especially appreciate information on one point: In any system such as Sperry's in which the effort to return a ship to its course depends upon absolute deviation from that course, it would seem that the steering gear would keep the rudder over until the ship had regained the intended course. Her head would then, due to inertia, keep swinging beyond this course, which at once would cause the steering gear to move the rudder to the other side. In other words, with this type of automatic steering it would seem that the ship would have a sinuous course, the steering gear constantly hunting to keep the ship on a proper mean course. Although the preceding seems the natural deduction from what is understood of the arrangement of automatic steering gear described the records of performance do not show such a result. I should like to ask whether any means for correcting such a hunting action of the steering gear was employed or whether any such means is considered necessary.

In explanation of this point, C. B. Mills, chief engineer of the Sperry Gyroscope Company, who read the paper because of Mr. Sperry's absence in Japan, stated that ships in which an automatic steering device has been installed are too large to deviate very greatly from the course on account of hunting action, the tendency to yaw being stopped almost immediately by the gear. A marked saving in fuel with the use of this equipment has been noted. Records of the *Munargo* since the device has been in operation were cited as an example of economies possible with this gear.

Details of Naval Design from Jutland

By Commander Herbert S. Howard (C. C.). U. S. N.

Abstract

THE many reports and discussions that have been published on the Battle of Jutland almost invariably have to do either with controversial points of strategy, movements of fleets and so forth, or major questions of design, particularly those comparative between British and German ships such as protection of vitals, turret magazine protection and so on.

There is a field, however, which comprises the performance of the different detail features of design of the naval ships in the battle which has so far never been discussed.

Of the ships sunk in the battle the *Queen Mary*, *Indefatigable*, *Invincible*, *Defence*, *Black Prince*, *Weisbaden* and *Pommern* were sunk as a result of complete explosion resulting from a salvo reaching a vital spot, or from a torpedo. The *Elbing* and also the *Turbulent* were rammed and sunk by German battleships.

These losses are generally eliminated then as involving major questions of design. We have left, then, of the total losses, on the British side one armored cruiser and seven destroyers, and on the German one battle cruiser, three light cruisers and five destroyers.

Fire might be taken as the principal source of danger to fighting ships and those aboard them. It brings in questions of inflammability of materials, fire systems, pipe lines and the menace of magazine explosion.

Most of the fires on the ships that were destroyed were entirely cordite fires, shells exploding in the vicinity of ammunition brought up and held ready to serve the secondary battery of large ships or the main battery of light cruisers and destroyers.

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On destroyers in general it would appear that one or two direct hits by large shells were enough to put the ship entirely out of commission. The same result followed from a few salvos from a light cruiser. Under these conditions fires broke out at once. On oil burning destroyers severe oil fires should have occurred. This, however, does not seem to have been the case. Of the six destroyers from which we have accounts, on two only were there apparently oil fires, which in both were overcome quickly and effectually.

The deduction from this is that fuel oil does not seem the menace to light ships that it has at times been considered.

In dealing with fires in action the most serious difficulty was apparently the fact that in many cases the shell explosion which caused the fire completely wrecked the fire main and hoses in the vicinity. Besides putting the local fire-fighting equipment out of commission, water from the broken fire mains poured out on the decks and down below into engine rooms and other spaces where holes in decks or hatches existed. As a suggestion, it would seem that shut-off valves with distant control gear, together with long emergency lengths of hose kept below protection, are necessary where fire-main risers pierce armor decks.

Summing up, the fire menace proved to be in general less serious than had been expected.

Outside of the main engines and boilers of a naval vessel, probably the most important item of her machinery is the steering gear.

Of the several steering-gear jams which occurred during the battle the only one of which we have the probable details is in the case of the *Warspite*. In that ship both steering engines were secured on a vertical bulkhead in the engine room, and, as far as could be told, the bulkhead was strained by the bursting of a shell in the vicinity. The result was to throw the engine out of line and cause it to labor and run hot. When the order was then given suddenly to put the helm over, the engine could not handle the sudden load and the jam followed. Of the mishaps on the *Invincible* and *Chester* we have no details, but it may be inferred that they were due entirely to excessive speed and sudden changes of course.

These accidents bring forward the great importance of the steering gear and primarily the fact that trial and test conditions are not those of trial alone, but the very conditions which will be met with and quite possibly surpassed in battle. To avoid similar mishaps in the future the gear must first of all be so located as to be as free from the surrounding structure as possible, so that damage to that structure may not be communicated to the foundations of the gear. Also in the design there must be no weak points, while the operation must be as simple as possible to prevent mistakes in connecting up or disconnecting in the excitement of battle. Finally and most important, the trial condition tests must be accepted as the ordinary working condition of battle.

The accounts of the battle bring up many interesting points to do with damage to turrets, and particularly their great powers of resistance against attack and their ability to keep going in spite of damage.

Of the records consulted, these show direct hits causing damage on turrets of the *Lion*, *Tiger*, *Malaya*, and three turrets of the *Derfflinger*. Many other direct hits on both turrets and barbettes of various ships were received without either penetration or damage, but the hits of interest to examine are those where damage was received. Of the battle cruisers blown up, some at least may have received their death blows through penetration of turrets or barbettes and explosions within.

For many years armor gratings have been fitted in the openings of armor decks of warships, and for many years ballistic tests of these gratings have been carried out at various proving grounds to test the resisting power against major shell impact, or the impact of smaller shells representing fragments. While these tests have been of great importance, they have never represented the grating in its actual service condition.

On the *Warspite* a 12-inch shell struck the armor grating over one boiler room, but did not penetrate and was deflected upwards. The gratings were bent, but none broken, and apparently did all the work intended. Subsequently it was found that two other heavy hits had been received direct on the gratings, but in each case the shell was deflected. These reports indicate most clearly that reliance may be placed upon well-designed armor gratings.

After the battle the splinter nets below the gratings were found full of fragments, which confirms the opinion held as to the necessity for some additional protection below those gratings which receive the direct impact.

Rather an extraordinary thing occurred on the *Derfflinger*. In the middle of the battle the main central or plotting room suddenly filled with gas and had to be abandoned. It was found that the gas from the powder fires in the after turrets, and probably also from the ship's own guns, and from shells exploding aboard, had passed down the voice tubes to the central and temporarily put the station out of commission.

There was clearly shown here the danger from gas penetration through voice tubes, and in fact through any form of communication between compartments through which gases may pass.

Torpedo nets had been used both by English and Germans for many years before this battle, the former having, it is believed, been the first of all navies to introduce their use. As far as is known, the British removed them from their ships before Jutland. The Germans, however, went into battle with the nets on board stowed brailed up against the side in sea position.

After the battle Admiral Scheer stated that the nets on most of the ships were so damaged that it was impossible to remove them. In many cases they hung down in festoons, so that it was a wonder the propellers were not entangled.

It has been realized for some time that nets could be of service only to ships at anchor or at the slowest speed. Now we have it most clearly shown that they may become a grave menace to ships in battle. It would seem, then, that the case against the torpedo nets is complete.

Discussion

In a written discussion of this paper Professor William Hovgaard, of the Massachusetts Institute of Technology, offered as suggestions additional matters of detail naval design which might be studied and reported upon from the records of the battle of Jutland. The behavior of ships under the stress of war service, their suitability for the particular duty to which they are assigned, the damage which they suffer in action and their behavior under various forms of attack—all these points should be carefully studied and an attempt made to draw conclusions which may be useful in the design of new ships. The emphasis which the author of the paper lays on the importance of a robust and reliable steering gear as well as on its effective protection is most timely. The matter of danger from fires due to the ignition of powder charges is a point to which designers should give the most careful study. On other points not referred to in the paper it is safe to draw conclusions: During the war numerous cases occurred where towing of disabled warships was necessary, in some cases the life of the ships depending on the success of the operation. Adequate appliances for the efficient towing of large vessels should be supplied and the personnel trained in their use.

The importance of being able to stop leaks promptly and effectively in action was hardly realized prior to the war but improved appliances suitable for this should be provided and the service pertaining to their use carefully organized.

Most of the warships that went down during the war cap-

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sized before they sank. To prevent or delay the process of capsizing and in general to right a ship quickly when she takes a list is of the greatest importance. Powerful means for righting the ship should be installed.

The serious consequences of salt water entering the feed tanks were demonstrated during the war. Feed water tanks should be so placed as to give them the best protection.

Rear Admiral A. P. Niblack, U. S. N., in discussing the fire hazard on board naval vessels in action, indicated that after practically every important naval engagement since the inception of the modern navies the question of fire on painted surfaces has been discussed. The present paper brings out very well the greatest points in fire hazard which are due mainly to cordite and other ammunition fires. In exhaustive tests by the Navy Department it has been impossible to ignite paint on steel surfaces, so this matter has finally been settled to the satisfaction of the constructors. Gases on board ship from shell explosions offer a very serious menace which must be guarded against by proper ventilation, the use of gas masks suitable for absorbing carbon monoxide and other means of protection. A great deal on the matter of ventilation is to be learned from the battle of Jutland. Since torpedo nets have never been used aboard ships of the United States Navy it is interesting to know that the decision of the Department not to equip our ships with them is borne out by the experience of the German ships during the battle of Jutland. One matter which should be investigated, for which practically no data are available, is the extent to which water coming aboard from shell explosions or other causes affects the fire control and other optical instruments of observation.

Commander Emory S. Land, C. C., U. S. N., suggested additional details of design to be studied, including watertight doors; flooding systems; drainage systems; communication systems, voice pipes, telephones and the like. Construction and operation of special equipment should be considered of equal importance; that is, when it is thought desirable to install equipment for special purposes on a vessel, such equipment should be used and the personnel trained in its operation.

Admiral D. W. Taylor, U. S. N., stated that during the battle both the offensive and defensive apparatus with which the ships were equipped functioned correctly and well. The question of fire hazard is probably the most important matter to be guarded against, cordite fires and apparatus for fighting them being the principal considerations under this head. Provisions should be made to protect the personnel against poison gases from shell explosions or other causes. The matter of torpedo nets was finally settled as a result of the German experience with them in the battle.

Stresses on Vessels of the Great Lakes Due to Waves of Varying Lengths and Heights

By Professor Herbert C. Sadler and Professor A. Lindblad

ABSTRACT

AT the last meeting of the committee on bulkheads and freeboard the question of including vessels on the Great Lakes in the assigning of freeboard came up. As no systematic investigation of the strength of this type of vessel had previously been made, it became necessary to carry out several strength calculations for the conditions met with in this region.

The study of waves encountered led to the conclusion that they seldom ran over 250 feet in length and that their heights appeared to be somewhat larger in proportion to their length than the usual ratio of 1:20.

Calculations were made for waves having the above characteristics on three types of vessels varying in length from 420 feet to 590 feet. The results are summarized in the form of bending moment factors and these will be included in the complete report to be published later in MARINE ENGINEERING AND SHIPPING AGE.

The conclusion drawn from the tests is that the lake freighters of today are for their service as strong as, if not stronger than, similar ocean-going types.

DISCUSSION

In a written discussion on this subject David Arnott, deputy chief surveyor of the American Bureau of Shipping, brought out the fact that in the design of any ship's structure it is desirable, if undue waste in material is to be avoided, not only to know the maximum load to be carried but the most trying conditions as to distribution of load and the kind of seas likely to be met with in the service for which a vessel is intended. It is of importance that the authors have included in the paper data on waves encountered on the Great Lakes and the assertion that a wave of 350 feet in length and 20 feet high is the worst that need be considered. The large single deck bulk freighters used on the Great Lakes are a product of design to meet special conditions, the aim being to get the maximum deadweight on a restricted breadth and draft. The proportion of length to breadth given in the paper for a 580-foot vessel is considerably in excess of any merchant vessel engaged in overseas service. The big lake freighters are well designed for their intended service; that is, the carriage of ore, coal and grain on the Great Lakes. The longitudinal structural strength could be improved by carrying the wing tanks to the deck but this would reduce the deadweight carrying capacity for grain cargoes. One consideration which should not be lost sight of in making strength comparisons is the absence of serious deterioration through corrosive action in the steel hulls of lake vessels and, although a margin for corrosion is not evident in the strength standard of ocean-going vessels, it is there nevertheless so that on this ground alone lake vessels could have lighter scantlings and lower initial strength standard.

Admiral D. W. Taylor, U. S. N., in his discussion also mentioned the fact that the wave data on the Great Lakes gathered for this paper are very valuable. The fact is mentioned that the waves encountered are steeper than those of ocean waves but the depth of water actually is not the cause of this condition. The length of a wave seems to determine its steepness. The shorter ocean waves are, the steeper they become and this same fact would be true for waves on the Great Lakes which are comparatively short.

WEDNESDAY AFTERNOON SESSION

No important routine business came up at the opening of this session, the reading of papers being continued directly. The order of papers was somewhat changed in the morning session so that the following paper, which was originally scheduled for Wednesday morning, was read the first thing in the afternoon.

The Application of Dyson's Method to Propellers of Ocean-Going Merchant Vessels

By E. A. Stevens, Jr.

ABSTRACT

IN 1920 Admiral C. W. Dyson presented a paper on "The Problem of the Hull and Its Screw Propeller," in which a number of examples were given. As these were all naval vessels the writer has attempted to apply Dyson's method to

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merchant vessel types and to compare the results with trial results on these vessels.

The problems may be divided into three groups. (1) Single screw vessels. (2) Vessels fitted with two or more screws—wing screws and struts. (3) Vessels with two or more screws—wing screws and bosses. Complete results of the comparisons will be published in detail in a later issue of MARINE ENGINEERING AND SHIPPING AGE. Seven are single screw ships, all of which with one exception have full lines, the block coefficients being over 0.77. Three are steel twin screw cargo and passenger ships or freighters. One is a moderate speed cargo and passenger vessel and the remaining two are high speed passenger vessels.

It is impossible to draw a general conclusion that will apply to all of these types of the comparative results obtained by Dyson's method of the actual trials as the complete tabular data contained in the paper must be studied for each individual case.

DISCUSSION

W. W. Smith, chief engineer of the Federal Shipbuilding Company, has found that because of the widely varying sea conditions encountered the 20 to 30 percent which the author adds to the ideal effective horsepower to obtain the effective horsepower at sea is a good allowance. No method of estimating, however, can predict the performance very closely for all conditions. The author is justified in his conclusion that the Dyson method is accurate for merchant type vessels, the trial results checking very closely with the estimated performance. Some of the differences noted are no doubt due to errors in measurement and the like. The analysis proved the reliability and accuracy of the Dyson method and so far as is known it is the only completely developed method for designing and analyzing propeller performance. Also it is the only one where the estimated performance checks closely with the trial results and where size, speed and cavitation are fully provided for.

In a written discussion Admiral Dyson brings out various points of difference with the author. He outlines the effect of spectacle frames and of the fin along the bottom of the ship when it is horizontal and at an angle with the hull. When the fin is horizontal or nearly so the basic slip of the hull is very much decreased from that which would exist when struts are used instead of spectacles. Also the K factor is reduced so that the new K factor equals the normal K factor of the hull of the one-seventh power. Where the fin is so located as to have no directive force upon water flowing to the screw, or to interfere with the water closing in around the hull, its effect on the basic slip and on K is nil. He goes on to discuss the conditions of the type 2 ship mentioned in the paper. When this ship is loaded down very deeply her estimated revolutions are considerably below those actually obtained. In such ships it is found better to make no correction as the ship is loaded down but to use for H the height from the base line to the upper limit of the stream line body. Any increase in block above this has no effect on the revolutions but it does effect the value of K.

A Study of the Wake of Certain Models by Means of a Current Meter

By Professor E. M. Bragg

ABSTRACT

BY means of a current meter fitted with model propellers of varying diameters certain results of the effect of wake on models have been derived in this paper.

Tests were made on a 10-foot varnished plane for a series of four wax models with constant length of entrance and varying length of run, for a series of five wax models with constant length of run and varying length of entrance and for six wax models with no family relation. The speeds at which the tests were made ranged from about 140 feet per minute to 250 feet per minute. In the fine models the wake showed a slight tendency to decrease as the speed increased, while in the full models the wake was constant up to 200 feet per minute but at higher speeds there was found a marked increase in the wake due probably to the position of the stern wave.

This study of the wake of models, while not extensive enough to be conclusive, indicates that any complete system for determining wake values must include the following conditions: (1) The diameter of the screw relative to the draft of the ship. (2) The draft of the ship relative to the breadth of the ship. (3) The fore and aft position of the screw. (4) The transverse position of the screw. (5) The vertical position of the screw relative to the keel. (6) The vertical prismatic coefficient of the ship.

Some Experiments on Propeller Position and Propulsive Efficiency

By Rear Admiral D. W. Taylor, C. C., U. S. N.

This paper is published on page 785 of this issue.

DISCUSSION

W. W. Smith, chief engineer of the Federal Shipbuilding Company, had prepared written discussion on each of these papers which he read. In discussing the paper on "A Study of Wake," he stated that the paper was valuable for estimating the wake factor but for estimating propeller performance two other hull coefficients are required—the hull efficiency and the rotative efficiency. In making propeller estimates some engineers assume the hull and rotative efficiencies to be unity, but this assumption may introduce considerable errors in certain cases. The following elements would seem to require consideration in determining the hull coefficients of a vessel: Proportion and form of afterbody, size and location of propeller, and numerous others, including struts and bossings, cutting away of deadwood, rake of shafting, trim of vessel, location of rudder behind screw, speed length ratio and the like. Because of the large number of features involved it does not seem feasible to treat their application in an elementary form, it appearing more practical to divide all vessels into six or eight main groups, preparing for each group suitable data and coefficients for all practical variations. Referring to tests at various drafts it would be of value if the author would give prismatic coefficients of the afterbody for each draft. This paper emphasizes the difficulty of making estimates accurately from general data and the importance of self-propulsion tests which represent exactly the conditions to be met with. Further self-propelled model tests will not be truly valuable until they are proved reliable, and this will not be true until a number of test and trial results are compared, coordinated and published.

In speaking of the paper on "Propeller Experiments," Mr. Smith declared that he had sought after reliable data for estimating the effect of speed on the performance of propellers but had found none which seemed reliable except the charts given by Admiral Dyson, which data are only applicable where Dyson's method of estimating propellers is used. It would be desirable to have similar data for estimating full size propellers from model experiments. The large increase in hull efficiency brought out in the information contained in the paper, due to raising the propeller, is extraordinary, the gain in efficiency varying from 8 percent to 32 percent, with an average of 16 percent. The author's statement that a high location of propellers is desirable be-

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cause of improved efficiency is contrary to the general idea that the lowest position is the most efficient. Admiral Dyson, for instance, gives an example in his book where lowering the propeller improves the efficiency greatly.

Mr. Smith ran tests on a small freighter driven by a Diesel engine to compare the propulsive efficiencies for high and low positions of the propeller and presents his findings in tabular form. In two cases a higher propulsive efficiency is obtained with the wheel in a lower position. This result, he states, is due to the higher slip ratio which occurs when the wheel is in the higher position; the higher slip ratio gives a lower propeller efficiency; also the pitch for the higher position must be less, which augments this effect.

Professor L. B. Chapman, of Lehigh University, in discussing the two papers together stated that when our knowledge of wake and the factors governing it has been carried a little further, propeller design will become simpler and more certain. From a large number of comparisons made between trials and the calculated results in Taylor's "Delta" diagrams when the wake could be closely estimated the check has been close indeed. The use of Taylor's charts is much simpler than any other methods and when proper wakes, thrust deductions and hull efficiencies are used the results are even more accurate.

Professor Bragg's suggestion of using a vertical prismatic coefficient is interesting, but the longitudinal coefficient (prismatic) of the afterbody is one of the most important factors. Difference in wake values between two of Professor Bragg's methods can hardly be charged to the difference in beam draft ratio. A comparison of these two methods on the same block coefficient and percentage of run shows a variation in wake of about 20 percent which is hard to explain.

THURSDAY MORNING SESSION

The second day's sessions of the thirtieth annual convention of the Society of Naval Architects and Marine Engineers was opened by President McFarland at 10:30 A. M. November 8 in the Auditorium at the Marine Exposition. The great interest that was shown by the members in the first day's work was continued, even more being present than at the first sessions. No routine work was taken up at this point of the meeting.

Efficiency in the Operation of Steamships

By Captain Daniel A. J. Sullivan

This paper will be published in a later issue.

DISCUSSION

In his remarks C. D. Mallory said that the salient features of ship operation had been covered very aptly in the paper by Captain Sullivan. Mr. Mallory's experience had been gained in the coastwise trade until 1917, after which time he was in charge of the Division of Operations of the Shipping Board until the end of the war. Since then he has been associated in operating twenty-three vessels on an intensive plan with a man who has had an extensive experience in foreign countries. He has come to the conclusion from intimate contact with foreign methods that with the high values in American ships and the correspondingly great interest and depreciation it is difficult for us to compete with other countries. Fuel, which is the biggest item of expense, by a proper study and application of efficiency in its use, will make competition easier. Oil for fuel is cheaper in this country than anywhere abroad. The United States Navy has learned more about its efficient use than any other navy in the world, and the Shipping Board is now making available this information to ship operators and engineers in the establishment of the naval school at Philadelphia. It is difficult to compare Shipping Board figures of operating costs with those of privately conducted concerns, since the latter are given a much wider latitude than in the case of the Shipping Board or ships allocated by the Shipping Board to private operators. The cost in general is higher for a Shipping Board vessel than for one privately operated.

James Donald seemed to think that the only proper way to compare operating conditions in this country with the ships of foreign countries was to prepare tables covering the same information as that given in the present paper. When the increased cost of wages in this country is included with items of first cost, depreciation and other high operating costs, little chance is left for American ships in competition with those of other powers.

Referring to the point made above, John L. Bogert presented a chart covering the items of the cost of operation of a fleet of one of the most successful foreign companies for a period of five years prior to the war. He particularly emphasized the item of fuel cost, which was given as 21.34 percent of the whole in 1911, when the fleet was composed mainly of steam driven vessels. At the end of five years, when practically all of the fleet consisted of motorships, the fuel cost had dropped to 16.58 percent. As in the case of railroads, ship operating costs must be reduced to the basis of cost per ton-mile. This matter has been taken up very satisfactorily on the lakes and can be applied to ships in the Atlantic trade. Comparisons on this basis could be made between all kinds of ships in a variety of service. Such a comparison could be established on a basis of Admiralty coefficients. Bearing out this statement, Mr. Bogert presented the comparison between a 370-foot ship and a 580-foot ship. In the former, 8 pounds of coal were consumed per 100-ton miles, while in the latter only 4.4 pounds of coal were consumed per 100-ton miles, making evident the fact that as the length of the ship goes up the fuel cost decreases quite rapidly.

Another contributor to the discussion familiar with the wage scales of Norway and Britain as well as with that of the United States, felt that other methods of reducing the cost of operation could be utilized without interfering with this item, which is not the most important. Efficient stevedoring, more rapid turn around, speedier loading, reduction of time at port and other items would contribute very greatly to the improvement in efficiency. The legislation governing tonnage dues, port charges, better contracts for towage and tug hire will aid in putting our ships on a competitive basis with those of other countries. From his experience with the carriage of oil this gentleman stated that, if a practical heating unit for liquefying the oil cargoes, especially crude oil, could be evolved, the motorship would solve many of the carrying problems of the oil companies.

E. H. Rigg, naval architect, New York Shipbuilding Corporation, referring to the cost of operation of vessels on the Great Lakes, brought out the point that lake vessels operate only during the summer months when the weather is good. A real comparison can hardly be made with ocean-going vessels, which must be used all the year around, in bad weather as well as good. Ships handicapped in this country by the high first cost will find it difficult to compete with more cheaply built foreign ships.

Professor Evers Burtner, of the Massachusetts Institute of Technology, in a written discussion offered a suggestion which has been found valuable by certain ship operating companies that a semi-graphical log sheet be used in maintaining records which act as a check and follow-up system to prevent unavoidable delays in turn round and the like. A summary is given in a sheet of this nature for the time required for different operations such as the time at port, time consumed at sea, demurrage repairs, speed in handling cargoes and the like.

G. E. Smith stated that since fuel and cargo handling

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costs represent about 50 percent of operating costs, it is better to promote efficiency in the use of the former and improve the methods of handling cargoes than to interfere with the smaller item—wages. A custom in this country which increases construction costs materially is for the prospective ship buyer to specify very largely exactly what type of ship and equipment he will accept. In foreign countries the constructor uses his judgment in these matters and gives the operator a satisfactory ship for the purpose desired but without the many refinements and special features included in ships built in this country.

A 1,650 Horsepower Gasoline Fire Boat

By A. D. Stevens

ABSTRACT

A DOZEN or more years ago the writer endeavored to develop a gasoline fire boat for the 7 odd miles of waterfront at Jacksonville. The boat was to have about 4,500 gallons per minute capacity, which could have been built at that period for less than $50,000. The use of gasoline on so large a scale did not appeal to the fire department at that time.

Four years ago, after the department had been converted to automobile trucks and motor fire engines, the fire-boat project was revived and the design of motor fire boat brought up to date.

The writer then submitted designs and specifications for the remodeling and conversion of *S. C. 145*, the boat the city had bought, which were accepted and ordered carried out under his directions as engineer in charge.

As a capacity of not less than 5,000 gallons per minute at 150 pounds pressure was desired and it was necessary to retain two of the three 220-horsepower propelling motors, it will be seen that there was no room to spare in a light wooden hull 110 feet by 14 feet by 8 feet.

In the forward 30 feet there are installed four 8-inch three-stage De Laval centrifugal fire pumps, each directly connected to a 300-horsepower "G. R. C." type Sterling eight-cylinder motor.

Since there are in the 50 feet by 14 feet machinery space forty-six gasoline motor cylinders aggregating 1,650 horsepower, the question of ventilation is of prime importance. This is provided for by two 2,000-cubic-foot-per-minute electric blowers, taking air through the after end of the steel trunk house and delivering it through ducts abreast of each propelling and pump engine.

In the 20-foot space used for the propelling machinery are two 220-horsepower six-cylinder air starting and reversing "Standard" motors, each driving a 48-inch diameter by 42-inch pitch three-bladed wheel of "Case" outward thrust pattern.

While the contract specifications of the pumping units called for a delivery (for each unit) of 1,250 gallons per minute at 150 pounds pressure and 1,100 gallons at 250 pounds, the tests at the builders' factory showed nearly 1,500 gallons at the lower pressure and 1,200 gallons at the higher. Tests at lower pressure gave a capacity of 1,750 gallons at 100 pounds, making a total of 7,000 gallons for the four pumps.

A special feature of this pump installation is that no compounding of the pumps is required to deliver the high pressure—250 pounds. The entire range of pressures is obtained by varying the speed of the engines.

Preliminary runs have developed a speed of 15 miles, with engines making 450 turns.

Summing up, the city of Jacksonville has secured, at a cost of less than $70,000, a fire boat of 7,000 gallons per minute capacity and a speed of 15 miles per hour, with a displacement of only 110 tons and a draft of 7 feet.

The Longitudinal Strength of Rigid Airships

By Professor William Hovgaard

ABSTRACT

THE general strength of rigid airships is a problem akin to the corresponding one for ordinary ships. This paper results from a study of the subject carried out by the author when retained by the Navy Department in connection with the design of the rigid airship *ZR-1*.

The main purpose of the paper is to show that of two methods of calculation developed the bending method is essentially sound, and that with certain modifications it is reliable as a means of comparison between the strength of different airships. The shear method, on the other hand, in spite of its laboriousness, is incomplete and gives the correct results only when the longitudinals are at the apices of a regular polygon and when at the same time they are of uniform strength.

The study of the complex reactions in an airship is built up synthetically from a number of simple cases, beginning with rectangular panels. Following the study of the panel the theoretical effects of shearing and bending in the structure of an airship of regular polygonal section are examined and the conclusions are applied to an actual ship.

In conclusion the author states that:

1. A wire, so long as it is in tension, will transmit compressive forces as effectively as an elastic strut.

2. A wire may transmit tension and compression without any sensible change in its tensile stress.

3. The tension in the shear wire when a panel forms part of an airship structure is the sum or difference of that due to shearing deflection and that due to the direct pull or compression acting at the joints.

4. The horizontal forces, whether tensile or compressive, acting at a joint of a panel are directed partly along the longitudinal and partly along the wire (or wires) which meet at the joint, provided the wire is not slack.

5. The aggregate effect of a longitudinal and adjoining wires is the same as that of a girder of an area equal to the sum of that of the longitudinal and of the fictitious bars equivalent to the wires meeting at the joint.

6. Initial tension in the wires prevents or greatly reduces slackness and enables the counterwires to act as effective strength members.

7. The bending method can be safely applied with a fair degree of approximation to airships.

8. In applying the bending method to an actual airship, it is recommended to deal independently with each frame section.

9. The method of shears is fundamentally in error when used as the sole means of determining the general stresses in the structure of an airship by a process of summation.

DISCUSSION

Commander Emory S. Land, C. C., U. S. N., Bureau of Aeronautics, presented a discussion on this paper prepared by Commander Jerome C. Hunsaker, C. C., U. S. N., Bureau of Aeronautics. In his own remarks prefacing the reading of this paper Commander Land stated that the *Z-R-2* disaster, which occurred during the past year, developed the necessity for a more complete understanding of the stresses occurring in the structure of airships. Reports published in the press at the time of the disaster and subsequent to it seemed to indicate that the longitudinal strength of the keel member of the ship was insufficient, eye witnesses reporting that she seemed to open along the bottom. As a matter of fact, this statement was in error as the side members of the structure gave way first, the question being unimportant as to whether the top members or the keel failed after this.

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In designs up to this time, the static forces on a ship were considered the important ones and it was thought that the allowances made for strength and the factors of safety incorporated in the design would take care of the aerodynamic forces. Investigation and the disasters noted in the past few months indicate that the aerodynamic forces under certain conditions may be even greater than the static forces and, as such, must be provided for in the original design of the strength members of the structure. The solution of problems in design are extremely difficult since they must take into account shearing, compression, tension and torsion forces.

The analogy made between the airship and the submarine is excellent and those who have aided in the solution of the problems encountered in the design of the latter should interest themselves and make available the results of their investigations in solving the airship problem.

The study of the stresses in rectangular panels, developed in the paper, forms an excellent basis for calculations. However, the actual problem is much more complicated where panels are bonded together, as in the airship structure.

Another point that must be considered in the investigation of actual ships is the fact that materials are more or less concentrated in weight at certain points, which is noticeably so at the keel. There is still a tremendous amount of work to be done in the laboratory, air tunnels, model basin and in the air on actual ships before the problem is completed.

Henry Goldmark, chairman of the committee of five on the investigation of the *Z-R2*, contributed valuable suggestions for the continuation of the work of investigating the subject and outlined the necessity of solving the problem of the forces acting on the ship, which are three-fold, the weight of the structure, the gas buoyancy and gas pressure and the aerodynamic forces which occur when the ship is being maneuvered. The theory of longitudinal strength is developed on the basis of beam action but the number of parts is so great that the method of least work is not usable. Approximate methods must be employed and checked so far as possible in model tests, theoretically, and finally checked by actual tests on ships.

Captain William J. Baxter, C. C., U. S. N., and Lieut.-Commander Harold E. Saunders, C. C., U. S. N., also contributed to the discussion of this paper.

Amendments to Constitution Adopted

FOR some years past several objectionable features have existed in the method of electing members to the Council of the society. The trouble has been carefully investigated by the officers of the society in the hope that the difficulties could be removed with the result that before the meetings this year the Council formulated changes to the constitution which were passed by the members at the Thursday meeting.

The wording of several sections of the constitution was changed but, as the meaning remains the same, these sections will not be included here. Those in which the revisions have altered the intent of the original sections are given below.

The principal provisions changed deal with membership of the Council and now read as follows:

ARTICLE IV—To read as follows:

1. *There shall be a Council composed of eighteen Members and nine Associates; and the President, Past Presidents, Honorary Vice-Presidents and Vice-Presidents shall also be Ex-Officio Council Members.*

2. The council *shall* meet at the call of the President *just prior to the annual general meeting of the Society and at such other times* as the interests of the Society may demand.

3. At all meetings of the Council *eight* members *thereof* shall constitute a quorum.

4. The term of office of Council Members shall be three years.

5. (a) *Prior to September First of each year the Executive Committee shall prepare ballots for filling the places of the Retiring Council Members.* The ballots shall contain the names of six *Members and three Associates of the Society* and shall be mailed as soon as practicable after September first of each year to all Members and Associates.

ARTICLE IV—Section 5, (b) to read:

(b) An independent nomination for Council Members may be made in writing by not less than thirty Members and Associates, of which number at least two-thirds must be Members; and if such nomination is received by the Secretary prior to September fifteenth, ballots shall then be prepared by him containing the names of those thus nominated and these ballots shall also be mailed to the membership.

(c) Each member may vote for not more than six Members and three Associates, and each Associate may vote for not more than three Associates to be Council Members.

The ballots shall be returned to the Secretary and canvassed by *the Council* at its meeting just prior to the annual general meeting of the Society; and the six Members of the Society and three Associates receiving the highest number of votes shall be declared elected Council Members.

(d) A vacancy in the office of Council *Member* shall be filled by the Council for the unexpired term.

As indicated, the provisions of Article IV, Section 5, allow for the election of exactly the number of individuals to the Council whose names appear on the ballot, thus avoiding the necessity of having the names of interested, active members of the society proposed on the ballot and then having these individuals eliminated in the election.

As noted above, the other changes in the constitution that were adopted are mainly in the wording, so that it does not seem necessary to include them in the report.

THURSDAY AFTERNOON SESSION

Colonel E. A. Simmons, president of the American Marine Association, was presented at the opening of the afternoon session by President McFarland. In his remarks Colonel Simmons cordially invited the naval architects to hold the professional meetings of the society in 1923 in conjunction with the exposition during Marine Week.

Following this, action was taken on ten names which had been proposed for election to the grade of member. Two associates were elected, one associate transferred to the grade of member and one junior to the grade of associate member.

Machinery and Trials of the Passenger Ships—American Legion Class

By Robert Warriner

ABSTRACT

THIS paper gives the results of a model with rudder pulled in the tank at Washington, D. C., a self-propelled model run in the same tank, and a fairly good standardization trial of the completed ship at a draft corresponding to one of those at which the models were tested.

The vessels of the *American Legion* class are of the shelter-deck type, with straight stem and cruiser stern. The framing is constructed on the longitudinal system, except at the bossing and at the ends. The shell plating is arranged with in and out strakes, with overlap butts below the water line. The principal dimensions are: Length overall, 535 feet; breadth molded, 72 feet; designed load draft from base line, 30 feet; corresponding displacement (tons), 20,980.

The two propeller shafts are supported by cast steel spectacle frames and the framing and plating of the ship are bossed out from where the stern tube interesects the hull to the point where it attaches to the spectacle frame. The keel is of the flat type and the rudder balanced, with double steel plates over cast steel frame.

The engines are designed for 12,000 shaft horsepower on two shafts, and each shaft is driven by compound turbines through single-reduction gear with two pinions and main gear wheel in a single plane.

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The screw propellers are of bronze, and are solid, three-bladed, 16 feet 6 inches diameter, 17 feet pitch, and each has 80.7 square feet of developed surface and 69.4 square feet of projected surface.

The lubricating oil is arranged on the gravity system with two pumps, two coolers and one gravity tank to each engine.

There is one V-shaped condenser to each engine with built steel shell, rolled brass tube plates and cast iron water ends.

The boiler installation consists of eight watertube boilers of the Yarrow type, arranged in two boiler rooms. The total heating surface in the eight boilers is 40,000 square feet. The boilers are oil fired, using mechanical burners and closed stokeholes.

The model for the vessels of this class was towed in the tank at Washington, D. C., under various conditions. The curves estimated from the tests show the shaft horsepower, revolutions per minute, and propulsive efficiency at 24 feet, 30 feet, and 36 feet draft.

The sea trials of the *President Pierce* were carried out at 24 feet draft, the lowest at which the models were tested and the easiest at which to ballast the ship, with the loads arranged so that at the high runs of the standardization trial, the draft would be as near as possible to the 24 feet and as near as possible to an even keel.

The plates given with the paper show the comparison of the model tests with the actual trial.

DISCUSSION

C. F. Bailey, engineering director, Newport News Shipbuilding and Dry Dock Company, gave an outline of the machinery details of the two *American Legion* class ships built by the Newport News Company which were somewhat different than those of similar ships built at other plants. For example, the main condensers on these two ships, the *President Cleveland* and the *President Jackson*, were reconstructed from condensers supplied by the Shipping Board. He went on to outline the full power trials of these two ships, the fuel consumption and the like, and to compare the results with the results given in the paper. He raised the question of the ability of the reduction gears to stand up under the continual overload to which they are being subjected in service.

E. H. Rigg, naval architect of the New York Shipbuilding Company, brought up the question of the discrepancy noted in the paper between the expected and the realized power. Several points of difference existed between the models and the ship as well as some differences between the propellers which no doubt would account for some of the error. The depth of water on the course can hardly be considered responsible because below 15 knots the effect of depth is hardly appreciable. The torsion meters used on the models may have read high as certain reports recently made would indicate.

Admiral C. W. Dyson, U. S. N., also noted the large discrepancy between the model basin trials and the actual trials of the vessel. The character of the hull, interference due to fins extending aft to the braces, and the like, probably had an influence on the matter.

Alfred J. C. Robertson, naval architect, Munson Steamship Line, gave details of operating results of the *American Legion* class ships in service. It is difficult, however, to eliminate actual conditions encountered in service that influence the operation of a ship so that comparisons may be made with trial or model test results.

Admiral D. W. Taylor, U. S. N., stated that this was not the first time that model basin results, when compared with full scale trials, have shown discrepancies. The fact, however, that the error reaches 12½ percent at 19 knots and 15 percent at lower speeds should be investigated. It has been found on exhaustive tests with naval vessels of all types that at speeds below 15 knots the depth of water on the course does not influence the run appreciably so that this factor can be disregarded in attempting to account for the great discrepancy noted in the paper. The question of fouling of the bottom might have a slight influence, the change of propeller speed on one vessel—the *President Pierce*—might have an effect; character of the hull, as brought out by Admiral Dyson, probably all influence the final result, the error being made up of small causes.

C. F. Bailey stated that it would be interesting to have data from the operators on the fireroom temperatures and the statement of the ability of the gears to stand up under heavy overloads which they are receiving in service.

Standardization as Affecting the Shipbuilding Industry in the United States

By E. H. Rigg

This paper is published on page 749 of this issue.

DISCUSSION

Hugo P. Frear, naval architect, Bethlehem Shipbuilding Corporation, Ltd., brought out the fact that the real standardized ship was one that could be built by several yards and which would be exactly similar in detail. If an individual builder in filling repeat orders could supply exactly the same type ship to the ship operator, such a ship would also be considered standard. During and immediately after the war, ships that may be considered standard were built in numbers at various plants but the chances are that occasion will never again arise when the necessity will exist for building ships in exactly the same way. It is hardly practicable to extend standardization beyond fittings and details in design and these considerations are not disregarded in this country. Shipbuilders and manufacturers develop standards of their own. The problem seems to be one of simplification rather than standardization. In his experience on standardization committees, a great deal of time and effort has been spent on standardizing the simplest fittings. However exhaustive the work will be, a start should be made. After standards are adopted shipbuilders and owners should follow them and give their support to the movement.

Professor William Hovgaard, Massachusetts Institute of Technology, stated that standardization can be carried to excess. The system should be elastic to take care of improvements. In Germany at the present time industries in general, including shipbuilding, are being subjected to the principles of standardization. Lists of standard fittings, machinery practices and the like are being published in technical journals from time to time outlining the progress of the work. The standards adopted are subject to modification as investigation and experience warrant changes. Once equipment is standardized, however, it should be used until it has been economically successful.

H. G. Smith did not feel that standardization would be carried too far. The two sections of ship standardization, as indicated in the paper, are the standardization of ship types and the standardization of parts. For the former, except in the event of war, the requirements for ships do not warrant quantity production. In the Navy, the standardization of parts, such as hatches, watertight doors, air ports and the like has been established, but when these standards have been submitted to the shipyards and put in effect improvements have made them practically of no use after a short time. He cited the example of a Chicago plant which was established for the manufacture of standard ship fittings. Jigs, fixtures and machinery were developed at great expense to turn out really excellent equipment but within a few months and before the original cost of the equipment had been returned from the products manufactured the

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standards had changed so that the entire machinery and other equipment had to be discarded. The company failed on account of the lack of sufficient orders. This brings out the point that when standards are adopted they should be retained for a sufficient length of time to at least cover the cost of establishing the necessary production equipment and organization. In other words, changes in standards should be made slowly.

Admiral A. P. Niblack, U.S.N., in his remarks indicated that standardization is almost entirely an American accomplishment. The British, however, have done a great deal in this connection in shipbuilding. The standard design of the torpedo boat destroyers adopted by the U. S. Navy is one of the greatest examples of standardization on record. With the exception of machinery and slight changes of construction in the engine and boiler spaces, everything on all the destroyers is the same. Very few individuals realize the work which has been done in standardizing machinery and machine supplies at the naval experimental station, Annapolis, Md. The Navy will supply any of its facilities and information on the subject to aid the shipbuilders in trying to arrive at suitable standards. A lot of money can be saved in the industry by using standard fittings that are available on the open market rather than attempting to make them in the shipyards.

H. H. Schulze, of the Bethlehem Shipbuilding Corporation, Ltd., stated that standardization in shipbuilding would only become effective when the shipowner was willing to accept the standards developed by the shipbuilder. Shipowners, particularly large buyers, have their own standards which render the standards of the shipbuilder useless and consequently entail an additional cost for construction. When, however, the owner's requirements are not specified, standardization either of individual items, groups of items or methods of construction are of the greatest value. Nearly all old line shipbuilding companies have adopted standardization of items such as flanges, fittings, shackles, etc., but few have attempted the standardization of an entire system such as anchor gear, boat gear, rigging and the like. Where such entire groups have been standardized, they are of great assistance in the preparation of bids for the reason that without investigation on the part of the estimator he has immediately at hand the results, including weight and cost, of the best practice. Even steam engineering piping, complicated as it is, can be standardized to meet practically all conditions.

Selection of the Best Kind of Propelling Machinery

By J. L. Ackerson

ABSTRACT

NEVER before has the marine engineering fraternity had so many different types of propelling machinery to select from, and there is no empirical formula which can be applied to help select the best type. Among the many factors to be considered are reliability (this is the most important single factor, for without reliability other advantages are very much discounted); economy in operation, initial cost, and weight.

The factors controlling reliability emanate from two different sources: (1) the owner through the selecting of competent personnel; and (2) the builder. No matter how well a machine has been designed and constructed, if placed in the hands of an incompetent operator it will become unreliable; and *vice versa*, no matter how good the operating engineer, if the proper factors have not been used in the design and care in the construction, then the machinery is again unreliable.

Economy in operation (that is, the fuel per horsepower) and initial cost usually bear a very close relation to each other, and it is only a question of figures to determine whether any particular type is worth the money as compared with any other type.

Weight is the least important except in the case of special types like shallow-draft boats, express-type steamers, warships, etc., because it is seldom that a ship is loaded down to a loaded draft mark, even when full of cargo. The subject matter of the paper is actually contained largely in tables comparing the following types of machinery and ships:

Geared turbines with Scotch boilers; geared turbines with watertube boilers; reciprocating steam engines with Scotch boilers; reciprocating steam engines with watertube boilers; Diesel engine 4-cycle; Diesel engine 2-cycle; for 5,000-ton freighter at 10½ knots; for 7,500-ton freighter at 11 knots; for 8,800-ton freighter at 10½ knots; for 10,000-ton freighter at 12½ knots; for 10,500-ton tanker at 10½ knots; for 17,000-ton displacement passenger ship at 15 knots.

The complete paper will be published in a later issue of MARINE ENGINEERING AND SHIPPING AGE.

DISCUSSION

James C. Shaw, assistant to the chief engineer, William Cramp and Son's Ship and Engine Building Company, outlined comparative trials between different types of steam driven and Burmeister and Wain Diesel engine driven ships. He criticized the various comparisons in the paper and stated that basic data for the hulls and similar information should be included, so that comparisons might be more accurately drawn. Single screw motorships and twin screw steamships should not be compared nor where the reverse condition exists; that is, single screw steamships and twin screw motorships.

John L. Bogert cited examples of the low cost of motorship operation from data at hand. From data contained in the paper he pointed out that on a round trip voyage between this country and Scandinavia sufficient fuel could be carried in the double bottoms to fuel a motorship for the voyage and sell enough abroad to pay for the cost of fuel on the entire trip.

New Type of Low Pressure Expansion Joint

AT the recent Marine Show, held at the Grand Central Palace, New York, the Griscom-Russell Company, New York, exhibited one of their G-R type C expansion joints. In this joint the flanges are of cast iron and the expansion metal of copper. All sizes of the joint have a single corrugation. The special features of this device pointed out were the depth of the corrugation which is used, and the fact that the sides of the corrugation are actually parallel for at least one inch of their length. These joints are manufactured on a special patented machine and this exclusive patented method of rolling, it is claimed, insures a uniform thickness of copper after completion of the joint. Maintaining practically unchanged the original copper thickness permits the use of a thinner sheet than has previously been used, increases the flexibility of the joints and eliminates thinned spots.

The manufacturer states that these joints are guaranteed to compress ¼ inch axially when subject to a compressive force of 125 pounds per inch nominal diameter, and to be capable of distortion laterally ⅛ inch with a force of 125 pounds per inch nominal diameter. The joints are of the low pressure type and are designed particularly for use on steam lines between the turbine and the condenser.

This improvement in expansion joint design is the result of months of experimentation and development by the manufacturers.

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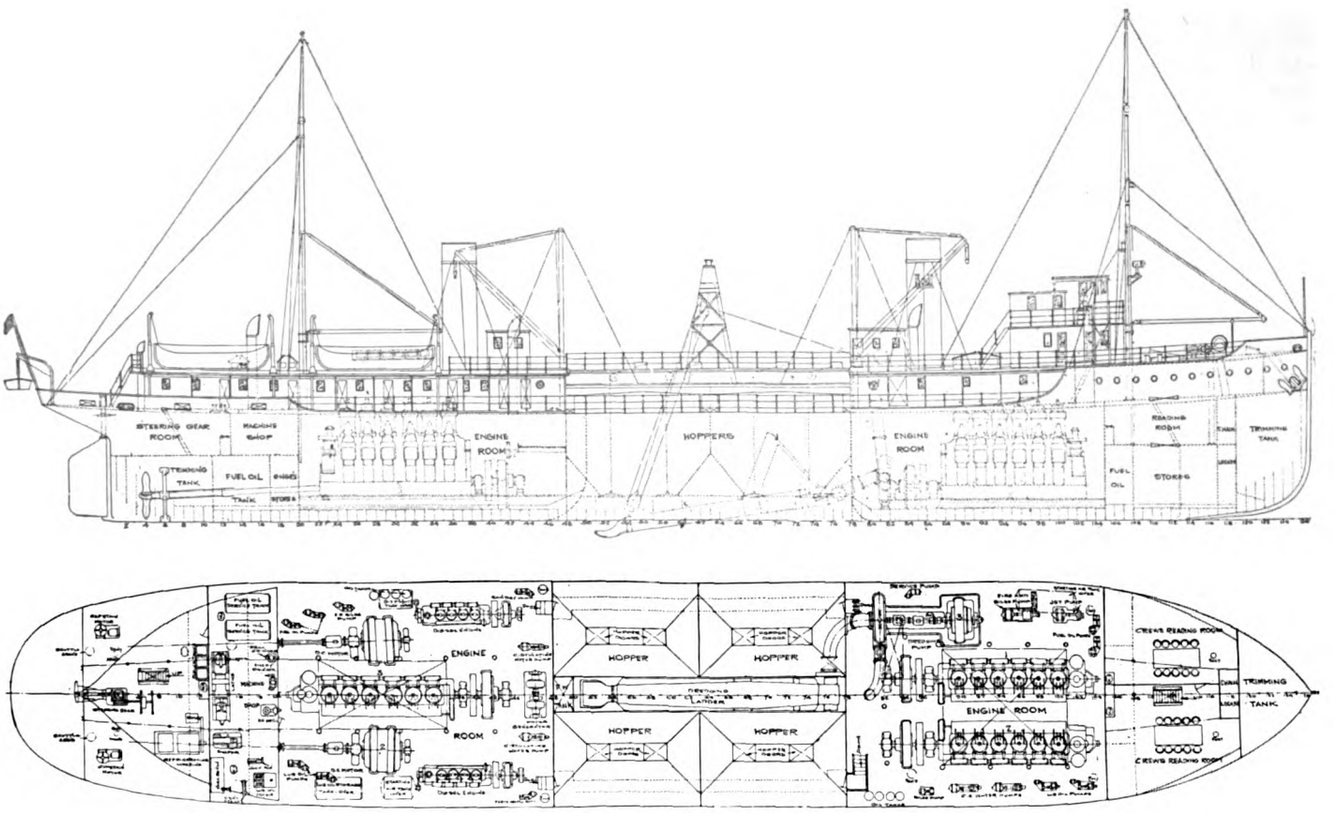

Profile and Hold Plan of Army Diesel-Electric Hopper Dredges

New U. S. Army Dredges to Be Completely Electrified

Power for Propulsion, Dredging and Auxiliary Purposes Provided by Three 1,000-Horsepower Diesel-Electric Generator Sets

An excellent illustration of the growing tendency to use electricity on shipboard is provided by the four hopper dredges which were designed by the United States Engineer Corps and are being built by the Sun Shipbuilding Company, Chester, Pa. On these vessels electricity is to be used for every possible purpose. It will propel the ships and steer them; it will operate the dredging pumps and all of the auxiliary machinery; it will supply heat in winter, cool breezes in summer, and ventilation at all times; and it will furnish hot water and do the cooking. Quite literally, there will be no fires of any kind aboard these dredges, save those in the cigars and pipes of the officers and crews.

These dredges are intended for harbor work and are to be thoroughly seaworthy. They are to have a length overall of 268 feet 5 inches; molded breadth of 46 feet; draft of 19 feet 6 inches; and total deadweight carrying capacity of about 2,000 tons. Midships in each vessel there is a well 56 feet long and 7 feet wide in which the suction pipe of the dredging pump is suspended. This pipe is 26 inches in diameter and 50 feet long. It is carried by a ladder and is so arranged that the intake end can be lowered into the silt to be removed. The dredging pump is of the 26-inch, volute-centrifugal, single-suction type. It discharges into hoppers located on either side of the well which have a total capacity of 1,250 cubic yards per ship. When the hoppers are filled, the dredge proceeds to the open sea and empties them by means of doors in the bottoms.

The main engines of each dredge consist of three 1,000 brake horsepower McIntosh & Seymour Diesel engines, each of which will be directly connected to a 700-kilowatt, 500-volt, direct-current Westinghouse electric generator of 150 revolutions per minute. These generators will furnish the power for operating the propellers and the dredging pump.

Each dredge is to be propelled by twin screws, and each propeller is to be direct connected to an 800-horsepower, 480-volt, direct-current Westinghouse motor of the double-armature type. The speed of these motors can be varied from 90 to 110 revolutions per minute.

The main dredge pump is to be driven by a 750-horsepower, 480-volt, direct-current Westinghouse motor, which has a speed variation of from 135 to 160 revolutions per minute.

The windings of both generators and motors will be impregnated with moisture-resisting compounds and enclosed by protecting covers. Forced ventilation will be provided by small motor-driven blowers.

Advantages of the Drive

Four special advantages will be gained by the use of Diesel-electric drive on these dredges.

Economy of Operation.—Because of the fuel economy of the Diesel engine, the operating cost of these dredges will be less than if steam drive were employed.

Freedom as to the Arrangement of the Machinery.—Were the propellers and the pumps of these dredges driven by direct-connected engines of any kind, the positions of all of

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these machines would be definitely fixed. In designing the vessels, therefore, the designer would be compelled to start with this machinery layout and adapt the dredging apparatus to it as best he could. With Diesel-electric drive, however, much greater freedom is given the designer, because the engine-generator units are not fixed as to location but can be placed almost anywhere on the vessel.

A study of the plans of these dredges shows that advantage has been taken of this fact. There are two engine rooms, one forward of the ladder well and containing the dredge pump, and the other aft of the well and containing the propeller motors. Only one engine-generator unit is placed in the aft engine room, while the other two are placed in the forward engine room at a considerable distance from the propellers and, moreover, off center. In other words, these vessels were designed primarily as dredges, and the machinery was fitted in wherever it could most conveniently go. Therefore, even if everything else were equal, these dredges will be more efficient *as dredges* than they would be, if the direct drive were used.

Interchangeability of Generators.—Were each propeller and the main dredge pump of these dredges driven by its own individual engine, the breaking down of any one of the engines would badly cripple the vessel on which the accident happened. Either the dredge pump would be out of commission, or the vessel would have to propel itself awkwardly with a single screw. But with the Diesel-electric drive the utmost flexibility of connections is permitted. The switching arrangements provide for seven different combinations; namely, any generator to any motor; any one of the three generators to both propeller motors; and either of two generators to the dredge motor. Consequently, the breaking down of one engine would not seriously interfere with the operation of either the dredge or the propellers, and even if two engines were down, the vessel could still be propelled without difficulty.

A special switching device has been designed to effect these various connections. This device is mounted on the main switchboard and consists of a group of contactors opened and closed by a system of cams which are operated by a handwheel. There are eight different positions for the handwheel, corresponding to the seven combinations and a point where all circuits are opened. The handwheel can be locked in each position, and cannot be moved until all circuits are open, so that heavy main-line currents are not broken by the contactors.

Ease of Maneuvering.—In accordance with standard Diesel-electric practice, all movements of the propeller motor are to be controlled by two small rheostats (one for each motor) located in the pilot house with duplicates in the engine room. The complete control of the vessel, therefore, will be in the hands of the navigating officer, which is very desirable because of the constant maneuvering that is required of these dredges.

Auxiliary Machinery

Among the motor-driven auxiliary machines on each dredge are 25 auxiliary pumps, 2 air compressors, the steering gear, a windlass, 2 capstans, 2 winches, 2 hopper-door openers, the ladder hoist and the refrigerating machine. Most of the motors for these machines are to be of the ordinary open standard type, with impregnated windings and noncorrodible small parts. The winch motors and the hopper-door motor, which are to be mounted on the open deck, are to be of the cast steel, watertight design which has proved so successful on the motorships *William Penn* and *Californian*.

The control of almost all of these motors is to be of the automatic type; that is, the operator merely pushes buttons or turns a light master switch to start, stop and control the speed of the motor. The use of controllers of this kind insures the maximum ease and safety of operation and is in line with modern industrial practice.

Included in the electrical equipment of each dredge are to be 88 electric room heaters, ranging from 1,000 to 5,000 watts each in capacity, three 5,000-watt water-heaters for each hot water boiler, 23 electric fans and two electric ranges of 22 kilowatts capacity each.

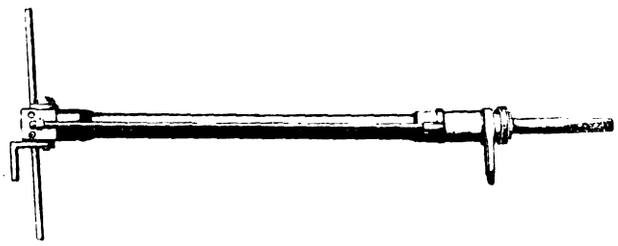
The auxiliaries will be supplied with current from two auxiliary Diesel engine driven 150-kilowatt, 250-volt generators, and also from a 150-horsepower motor-generator set which can be supplied with power from the generator normally used to operate the dredge pump motor.

All of the electrical equipment on these dredges is being supplied by the Westinghouse Electric and Manufacturing Company.

New Type Rivet Cutter

ON the principle that when cutting rivets, a number of comparatively light, rapid blows cause more vibration and therefore more distortion of steel plates than a few intermittent, heavy blows, the Chicago Pneumatic Tool Company, New York, has designed and manufactured a new type of rivet cutter known as the "Boyer Superior."

Its construction is described as consisting of a dead handle, a throttle handle of the crank design, a throttle valve of the taper type, a back head screwed onto the cylinder and secured by a locking device, a cushion chamber in the rear end



Improved Rivet Cutter

of the cylinder, a cylinder of seamless steel tubing, a bypass from back to front head, a non-removable electrically welded front head, square coiled spring buffer, adjustable chisel lock, hand hold of the spade handle type and chisel.

To operate, the throttle handle is moved in a line parallel with the cylinder. Each forward and return stroke of the piston is hand controlled. About four blows, requiring approximately 10 to 15 seconds, are said to be required to cut off the head of a ¾-inch rivet. Two men are required to operate the machine. It can be used wherever rivets are to be cut.

MECHANICAL ENGINEERS' ANNUAL MEETING.—The annual meeting of the American Society of Mechanical Engineers will be held at 29 West 39th street, New York City, December 4 to 7. On Monday, December 4, there will be public hearings on the Boiler Code and a joint session with the American Society of Refrigerating Engineers. On Tuesday there will be sessions covering management, machine shop practice, materials handling, training for the industries, research, steam tables, a public hearing on power test codes and a general session. On Wednesday the general session will be continued and there will be sessions covering fuels and railroad practice. In the evening there will be a joint session with the American Economic Association. On Thursday are scheduled sessions on power, standardization, safety engineering, ordnance, aeronautics and forest products.

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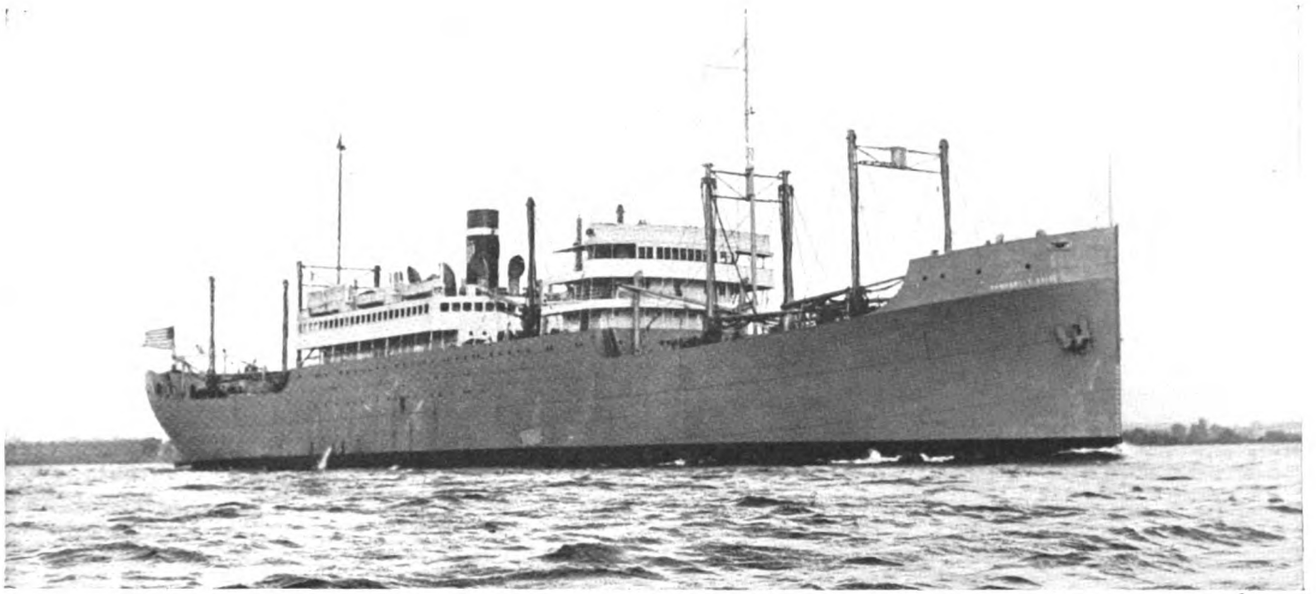


©New York Shipbuilding Corporation

One of the 502-Foot Shipping Board Passenger Vessels

Shipping Board Establishes Standard for Efficient Performance of Its 502-Foot Passenger Vessels

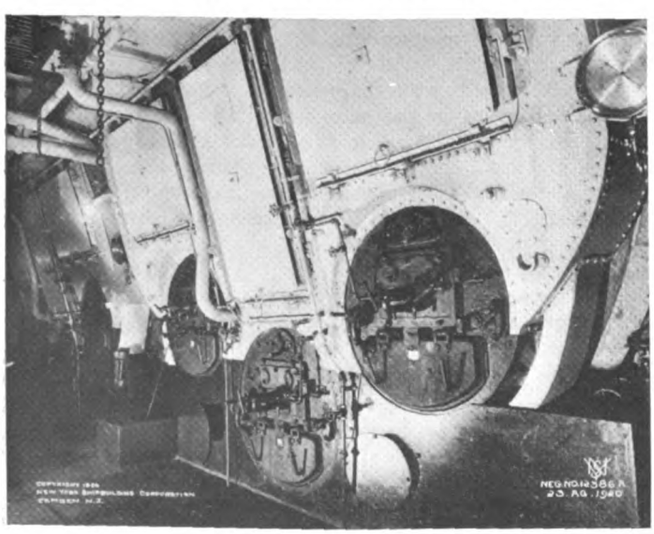
Fuel Conservation Committee Adopts Mileage Traveled Per Ton of Fuel, Based on Average Conditions, As the Standard

THE campaign of the United States Shipping Board to increase the efficiency of operation in the engine department, and thereby reduce the fuel bill, of the vessels operated by the Board is being carried out by the workings of the Fuel Conservation Committee, appointed by Vice-President Joseph E. Sheedy of the United States Shipping Board Emergency Fleet Corporation, from the various engineering societies and organizations. The members of this committee are:

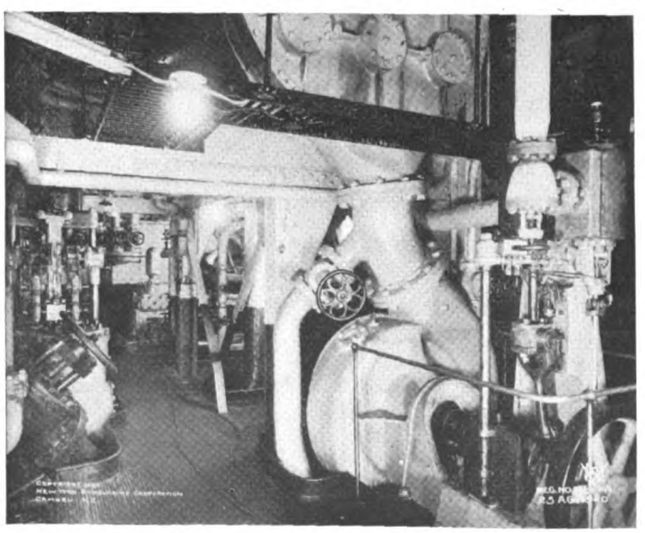
Captain C. A. McAllister, chairman; Commander R. D. Gatewood (C. C.), U. S. N.; E. H. Peabody, D. M. Myers, Maurice Healey, Major George M. Talbot, F. B. Webster, H. B. Taylor, C. J. Jefferson, E. A. Stevens and C. H. Jack.

Many engineering problems of a most interesting nature to the marine world have already arisen. Chief among these problems has been that of establishing a standard of performance that is applicable to the every day operation of a fleet made up of several score types of vessels, this standard to be reasonably correct for average conditions and not to be based on the results obtained on any single short trial trip performance.

To solve this problem, the active fleet of the United States



Oil Burning Boilers



Engine Room Auxiliaries

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Average Data for Performance Standardization: 502-Foot Passenger and Freight Vessels

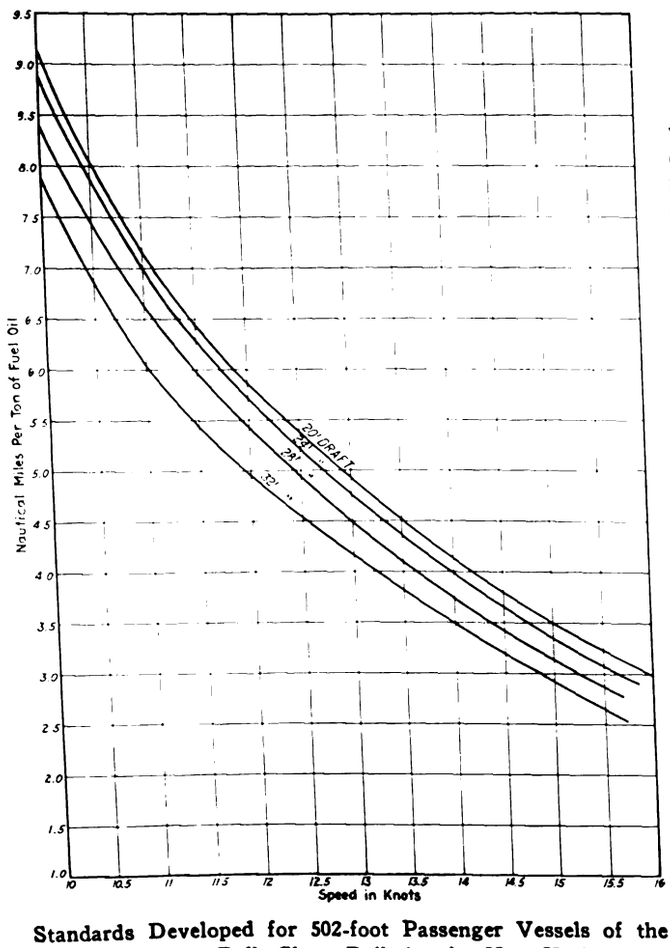
Vessel	Draft	R.P.M.	Observed Speed	Tons Fuel per 24 Hrs.	Lbs. Fuel per Mile	Knots per Ton: A Actual	Knots per Ton: B Theoretical	Knots per Ton: A/B Correction Factor
President Polk	22′ 9½″	96.7	13.7	73.1	502.4	4.47	4.24	1.053
President Van Buren	21′ 9¾″	106.3	14.67	101.86	648.6	3.46	3.60	0.9609
President Garfield	23′ 2½″	101.6	14.5	100.4	646.3	3.48	3.54	0.955
President Adams	22′ 1¾″	104.9	14.26	97.6	637.26	3.53	3.67	0.9339
President Harrison	23′ 3¾″	95.5	13.08	74.3	529.3	4.25	4.79	0.9025
President Hayes	23′ 3½″	94.3	13.26	80.3	564.9	3.97	4.42	0.897
President Monroe	20′ 11¾″	100.96	13.80	99.95	673.43	3.34	4.14	0.806
Grand average	22′ 7½″	100.8	13.9	80.6	600.9	3.74	4.06	0.921

Shipping Board has been cataloged under a minimum number of classes, the factors affecting this cataloging being: type of boilers, type of driving machinery, hull design, kind of fuel, type of auxiliaries and the propeller design.

The next step in the problem was to establish a factor of performance which would be subjected to the least variable and which could be determined the most accurately. The ideal factor to use would be the British thermal units per indicated horsepower relation, but this could not be used as the collection of the necessary data to utilize such a standard would be well nigh impossible and in order to obtain data which would give even reasonable approximation of the actual value, the cost would offset the gains made in the efficiencies of performance, which is a frequent fault of efficiency engineers and is being carefully avoided by the Fuel Conservation Section.

The final standard adopted as the one least subject to variables and which could be applied most accurately and readily to actual performance is the mileage per ton of fuel.

The standardization curves are based on effective horsepower curves made from tests on the tank models with corrections made for average weather, deep sea and average bottom condition, the horsepower at various speeds and drafts having been determined. The fuel consumption was computed using a variable fuel per indicated horsepower value, depending upon the percentage of auxiliary load to main engine power and the varying water rates of main engine at different percentages of power developed with the varying evaporation factor based upon percentage of the boiler power developed. The accompanying curves show the standards developed for the 502-foot passenger vessels of the *President Polk* (ex—*Granite State*) class.



Standards Developed for 502-foot Passenger Vessels of the President Polk Class, Built by the New York Shipbuilding Corporation

The principal characteristics are as follows:

Length between perpendiculars	502 feet 0 inches
Breadth	62 feet 0 inches
Depth	42 feet 0 inches
Loaded draft	32 feet 3 inches
Deadweight tonnage	13,000
Speed (knots)	14.5
Engines	2-4-cylinder triple expansion 7,000 horsepower
Propellers	2
Boilers	6 Scotch
Heating surface (each)	2,666 square feet
Built by	New York Shipbuilding Corporation, Camden, N. J.

The curves are applicable to average deep sea and average weather conditions, so with extraordinarily smooth seas a plus correction must be applied while with very heavy seas a minus correction is used. The curves do not represent the maximum efficiencies that can be produced by the vessels of this class. They do, however, give a possible performance standard which all of the vessels can attain without extraordinary modifications in their equipment.

The tabulated actual performances of seven of these vessels for a number of voyages show how these curves can be used to determine the efficiency of performance. It will be noted that the average efficiency for these vessels is 92 percent while the best showing is 105 percent and the poorest performance is 80.6 percent.

This variance in efficiency is traceable to the condition of furnace fittings, condition of steam and water end of auxiliaries, condition of main engine piston and cylinders, methods of operation and other like causes, all of which can and will be corrected and the results of the methods employed in making these corrections can be readily checked by referring the performance to the standards shown on the curves.

This is the first class of vessels for which these standards have been developed by the Fuel Conservation Committee and represents but the beginning of a large task. It is, however, a definite step along the lines of real efficiency engineering and a constructive effort towards the permanency of the United States merchant marine.

SOUTH AMERICAN MAIL SUBSIDY CONTINUED.—The ten-year contract between the Government of the Union of South Africa and the Castle-Vail Steamship Company for transporting weekly the mails in both directions between Southampton and Cape Town, which expired September 30, 1922, has been extended for two years.

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How Propeller Position Affects Propulsive Efficiency

Paper read at annual meeting of Society of Naval Architects and Marine Engineers by Rear Admiral D. W. Taylor (C. C.), U. S. N., honorary vice-president of the Society, dean of American naval architects and former Chief Constructor of the United States Navy, giving results of Model Basin experiments on propeller position and propulsive efficiency for single-screw low-speed vessels.

AFTER publication of results of years of Model Basin experimentation, the naval architect and marine engineer can now determine in advance with reasonable accuracy, for normal forms, the effective horsepower of a ship and the dimensions and proportions of a propeller which would propel the ship with high efficiency, if it were Froude's phantom ship, which has the resistance of the actual ship but is assumed not to disturb the water.

But we have to deal with actual ships, and the reactions between ship and propeller are very complicated phenomena. The wake of the ship of course affects the action of the propeller, and the suction of the propeller adds to the resistance of the ship. The thrust deduction is always positive, *i. e.,* the thrust is greater than the resistance of the ship without the propeller. Nearly always, however, the wake is also positive, which tends to increase the efficiency of propulsion. We generally and conveniently characterize the net results of the opposing factors as hull efficiency. If this is unity, the power required to propel the actual ship is the same as if it were Froude's phantom ship, while a hull efficiency greater than unity means that we can get along with less power and vice versa.

Factors Affecting Hull Efficiency

A brief enumeration of the factors affecting hull efficiency indicates the difficulties of dealing with it accurately. Considering the hull, it is affected by dimension and shape, but more particularly by the fullness and shape of the after body. A "V" stern, for instance, will show a somewhat different wake from a "U" stern, and the thrust deductions upon it will not be quite the same.

Considering the propeller alone, the hull efficiency must be somewhat dependent upon its dimensions and proportions, blade area, blade thickness, shape of blade, etc.

Considering the combination of ship and propellers, the hull efficiency must be affected by the number and locations of the propellers. For a single-screw ship, the propeller position may be varied vertically and longitudinally. For vessels of two or more screws, locations may be varied transversely for side screws.

For high-speed ships the hull efficiency must be affected by speed.

Probably of the many factors involved, those of location are most in need of systematic investigation because in many practical cases there is some choice of location and we would like to know whether we can gain anything by making a proper choice, and also whether we could gain by so shaping our designs as to permit a favorable location without counterbalancing loss in other respects.

Location of Propeller for Single-Screw Low-Speed Vessel

The experiments which are the subject of this paper, recently made at the United States Model Basin, deal with the question of location for a single-screw low-speed vessel. They were initiated while I was chief constructor, and my successor, Chief Constructor Beuret, has kindly permitted their publication. The lines of the model used are shown in Fig. 1, and it will be observed that it is of rather a full type. It is hoped that at some future time, if an opportunity permits, the stern lines may be further fined and the experiments repeated.

Fig. 2 shows the three model propellers used. With the possible exception of 571, they were smaller than would be used for the actual ship in practice. This permits a maximum vertical change of position and insures that the propellers work at a high real slip and cover a wide variation of slip. Fig. 3, supplemented by Table I, shows the test positions for the propellers, three positions at the upper level, three at the lower level, and three propellers used in each position. It was then necessary to make eighteen sets of runs at each speed of model. Figs. 4, 5 and 6 show the usual characteristic curves of the three propellers as tested apart from the model. In making the tests with the pro-

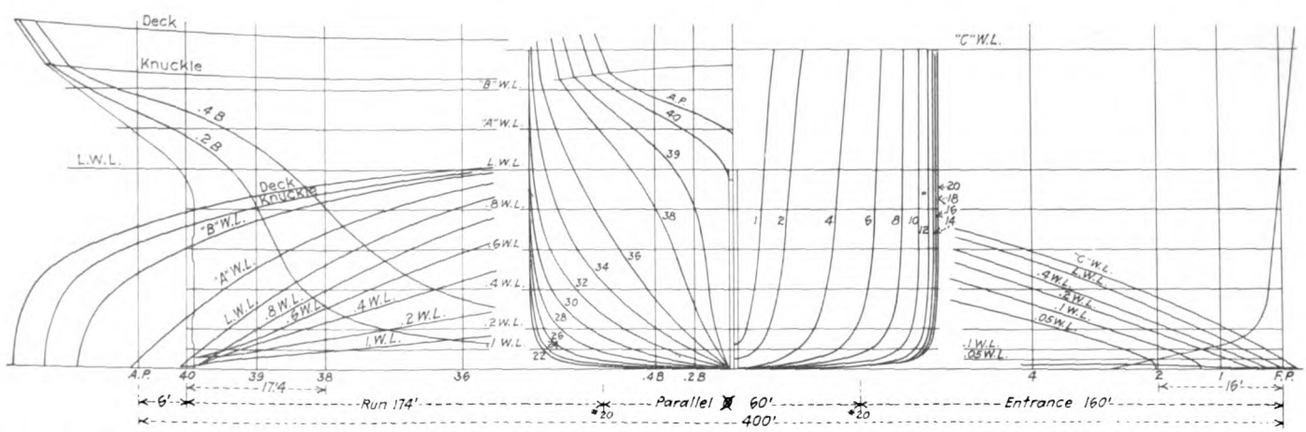

Fig. 1.—Lines of Model No. 2441, Representing 400-Foot Ship: Length of Ship Between Perpendiculars, 400 Feet; Beam, 52 Feet; Draft, 25 Feet; Displacement in Sea Water, 11,150 Tons; Block Coefficient, 0.75; Midship Section Coefficient, 0.975; Longitudinal Coefficient, 0.769

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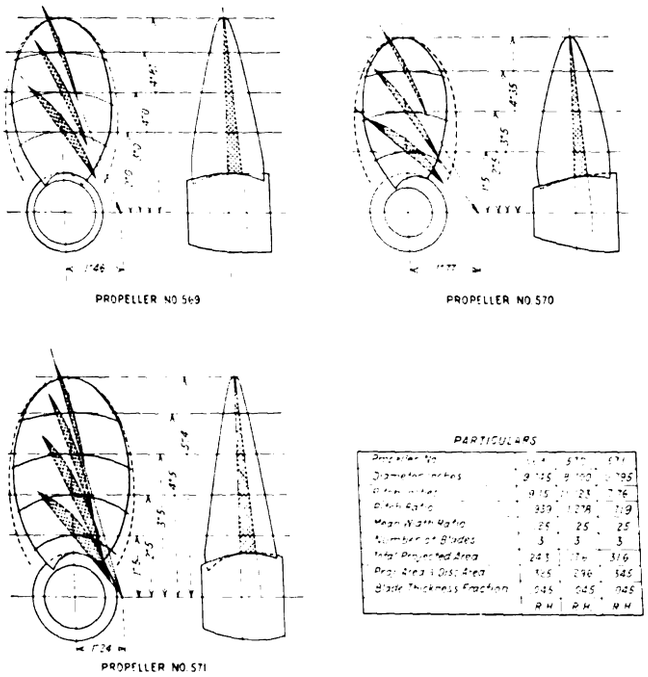

Fig. 2.—Model Propellers Used with Model No. 2441

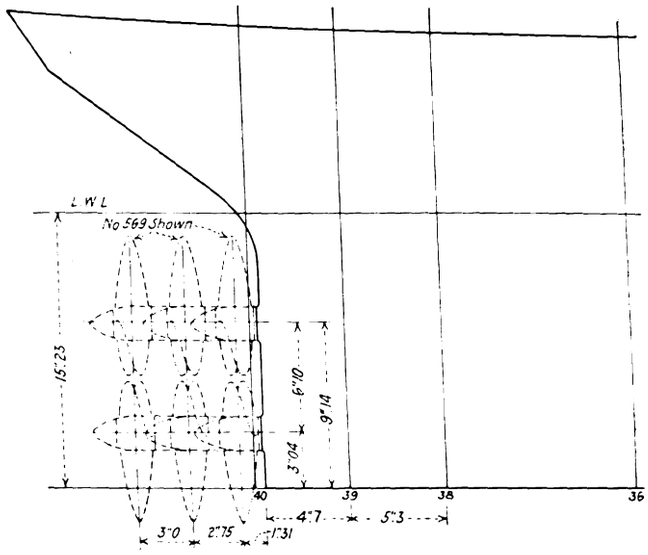

Fig. 3.—Positions of Model Propellers in Tests of Model No. 2441

pellers attached, the model was self-propelled at the desired speed, the torque and thrust being determined. From this there were deduced the two quantities w and t. The average speed of the wake over the propeller area is the speed of the ship multiplied by w, the wake fraction. The thrust deduction coefficient t is a quantity such that the actual thrust multiplied by the factor $(1 - t)$ is the resistance of the vessel without the propeller. The hull efficiency, as usual, is expressed by $1 - t/1 - w$.

Tests were made at a number of speeds extending from 2 knots speed of the model to 2.8 knots speed of the model, but the variations in the results with speed were not sufficiently marked with this model to be significant.

Results of Tests

Fig. 7 shows the reduced results in the small tables, each located with its center in the same position relative to the ship (indicated by the stern outline) as the propeller centers. As is to be expected from a single set of experiments on such a small scale, there are some inconsistencies in the results. It would require other experiments enabling cross-fairing to eliminate them. Broadly speaking, however, Fig. 7, which is confirmed by the results at other speeds, shows that the dimensions and proportions of the screw had a minor effect upon the hull efficiency. The very wide variation of slip resulting from the variation in screw dimensions had

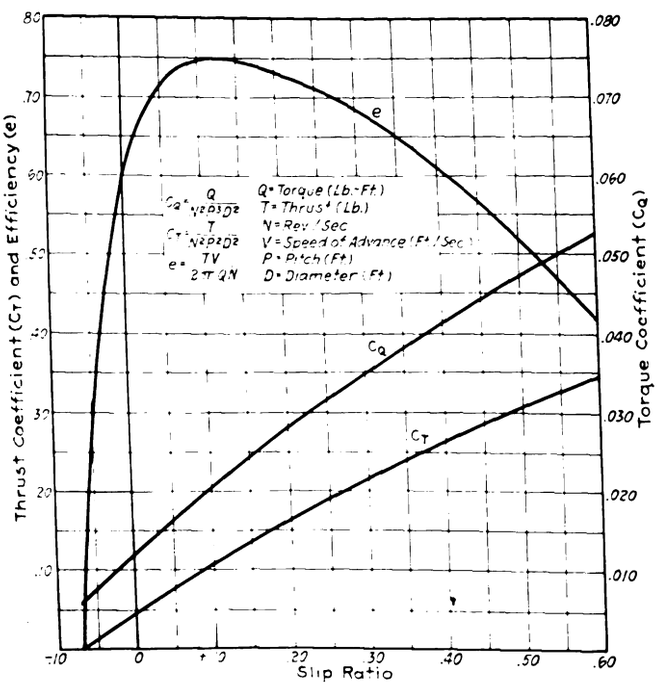

Fig. 4.—Propeller No. 570, Coefficients and Efficiency

Diameter, 8.70 inches; mean width ratio, 0.250; pitch, 11.37 inches, R.H.; number of blades, 3; speed of advance, 2.5 knots; blade tips submerged 4⅞ inches.

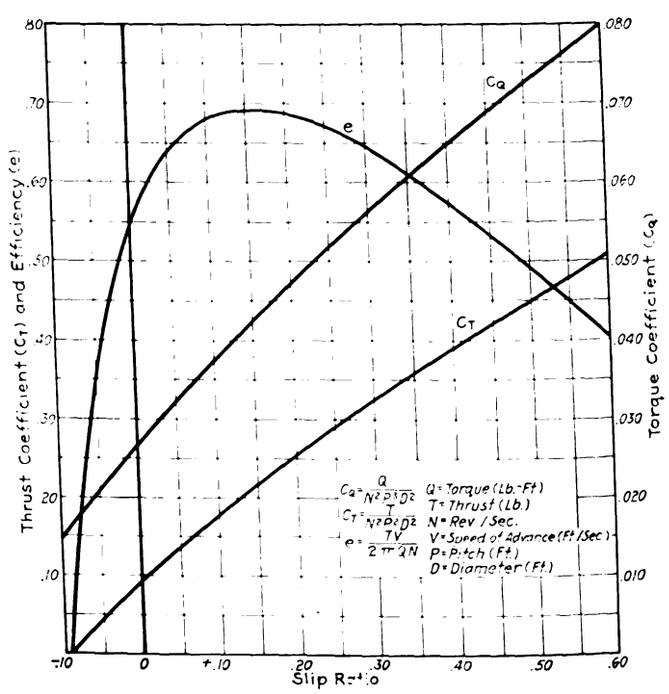

Fig. 5.—Propeller No. 569, Coefficients and Efficiency

Diameter, 9.745 inches; mean width ratio, 0.250; pitch, 9.25 inches, R.H.; number of blades, 3; speed of advance, 2.5 knots; blade tips submerged 4⅜ inches.

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comparatively little effect. At each level, as the screw was placed further and further aft, the wake fraction and thrust deduction coefficient fell off steadily. These changes rather neutralize one another, so that in this case it does not appear there was any material gain by variation in the fore and aft position of the propeller. When, however, we consider the vertical variation, it is another story. For the upper locations the hull efficiency is consistently higher than for the lower, the gains being somewhere between 15 and 20 percent. This is in accordance with what might be expected from theoretical considerations.

It would seem that the naval architect is confronted by another case of conflicting tendencies where a compromise is necessary. For the majority of vessels virtually all considerations, except that of hull efficiency, dictate the lowest practicable position of the propeller. Doubtless in sea-going vessels with reciprocating engines the considerations dictating maximum submergence must preponderate, but for vessels with types of propelling machinery not subject to racing in heavy weather, and for vessels primarily for smooth-water service, we cannot ignore the fact that the higher the propeller location the greater the hull efficiency and hence possible efficiency of propulsion.

I say "possible" efficiency of propulsion because to take full advantage of the greater wake associated with high propeller locations, the high propeller should be of somewhat greater diameter than the low propeller for such a vessel as Model 2441.

In conclusion, I should like to record my appreciation of the assistance in the preparation of this paper given me by the Model Basin Staff, headed by Captain Eggert (C. C.), U. S. N., in charge of the Model Basin. It was necessary to interfere with other important work to get in these experiments. I hope further experiments along this line, planned at the Model Basin, may appear in the *Transactions* of the Society in due time.

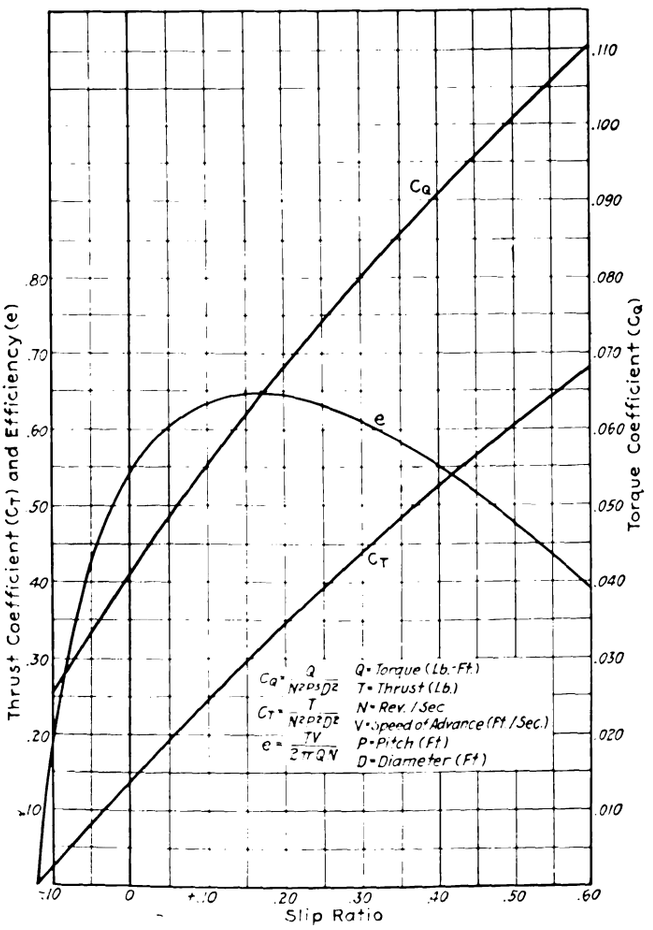
Thrust Coefficient (C_T) and Efficiency (e)
Torque Coefficient (C_Q)
Slip Ratio
C_Q
e
C_T
$C_Q = \frac{Q}{N^2 p s D^2}$ Q = Torque (Lb.-Ft.)
$C_T = \frac{T}{N^2 D^2 D^2}$ T = Thrust (Lb.)
$e = \frac{TV}{2\pi Q N}$ N = Rev. / Sec
V = Speed of Advance (Ft./Sec.)
P = Pitch (Ft.)
D = Diameter (Ft.)

Fig. 6.—Propeller No. 571, Coefficients and Efficiency

Diameter, 10.795 inches; mean width ratio, 0.250; pitch, 7.82 inches, R. H.; number of blades, 3; speed of advance, 2.5 knots; blade tips submerged 3⅞ inches.

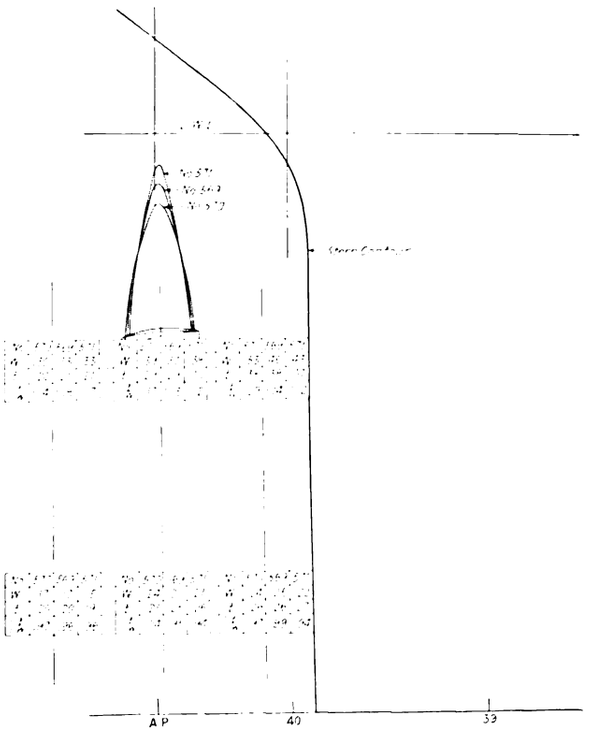

Fig. 7.—Wake Fraction, Thrust Deduction and Hull Efficiency Tabulated at Respective Positions Relative to Hull at Which Observed. Model Speed, 2.6 Knots; Ship Speed, 11.57 Knots

TABLE I.—PROPELLERS FOR MODEL 2441

Models $\frac{1}{19.7}$ full size.

Propeller No.	570	569	571
Diameter	8.7″	9.7″	10.8″
Pitch	11.4″	9.2″	7.8″
Tips submerged, upper position	1.7″	1.2″	0.7″
Tips submerged, lower position	7.8″	7.3″	6.8″
Tips below keel, lower position.	1.3″	1.8″	2.4″

Correction

IN connection with the article on "Line Shafts for Marine Internal Combustion Engines," by Joseph Hecking, in the November issue of MARINE ENGINEERING AND SHIPPING AGE, the attention of our readers is directed to a printer's error in the formulæ Nos. 11 and 12 on page 718.

In both formulæ the value (1 + C) should be added, so that the formulæ will read, respectively, as follows:

$$d = .683 \sqrt[3]{\frac{p D^2 S N}{5{,}000}} (1 + C) \qquad (11)$$

$$d = .861 \sqrt[3]{\frac{p D^2 S N}{5{,}000}} (1 + C) \qquad (12)$$

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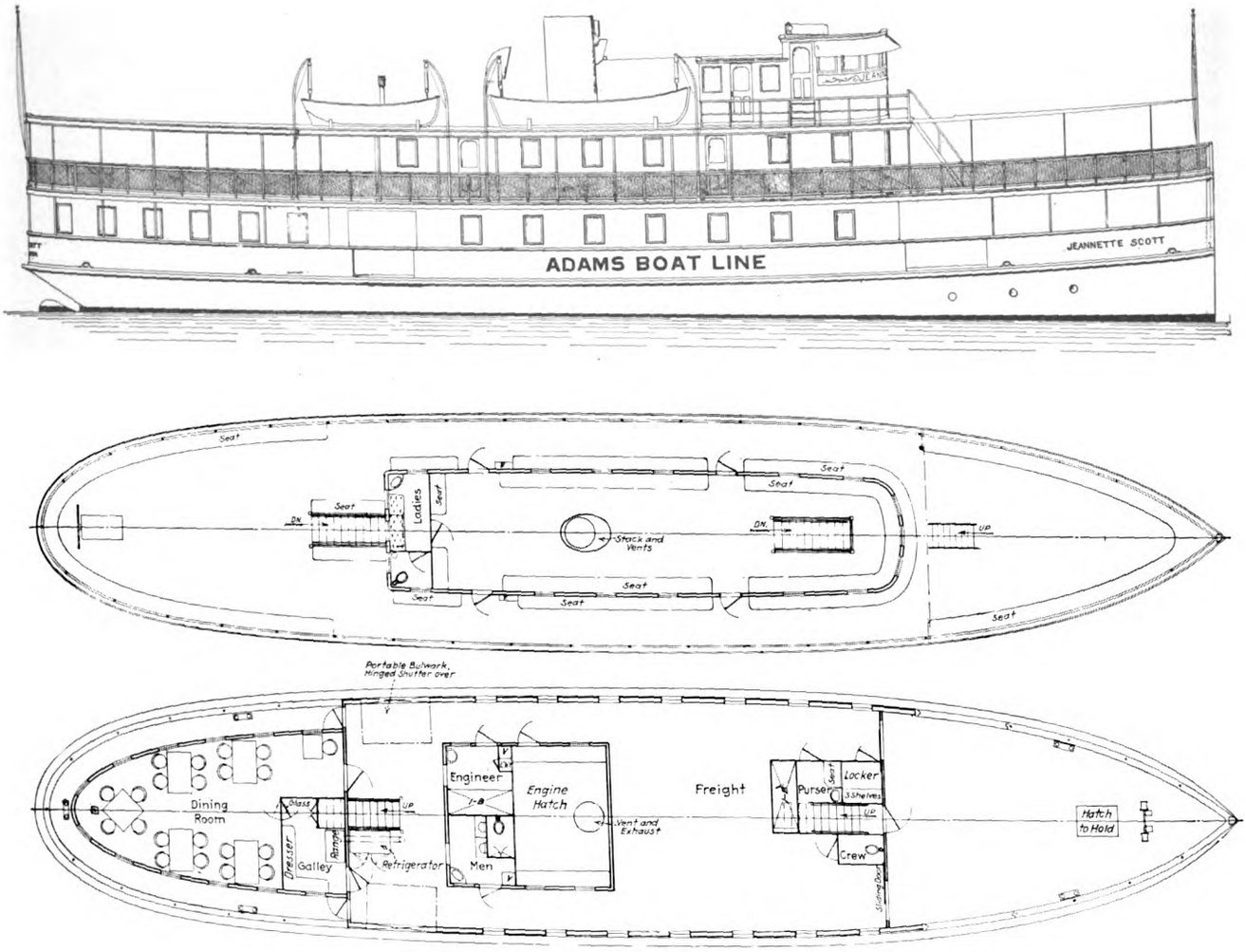

M. S. Jeannette Scott: Profile and Deck Plans

Freight and Passenger Vessel for Florida Service

Mobile Shipyard Building Wooden Motorship, Reinforced with Steel, Designed by Cox and Stevens for Adams Boat Line

THERE is now under construction at the Murnan Shipbuilding Corporation, Mobile, Ala., a new freight and passenger boat equipped with oil engines which is being built from the designs of Cox and Stevens, naval architects, New York, and under their supervision for the Adams Boat Line, Inc. This company does business between Tampa, St. Petersburg, Manatee River and Sarasota Bay towns. The new boat, however, will be used on the run between Tampa, St. Petersburg, Palmetto and Bradentown.

The general type of this new boat, which will be called the *Jeannette Scott,* is somewhat of a departure, the hull being of wood reinforced with steel, and the machinery of the heavy oil type. The dimensions are as follows:

Length overall	120 feet	
Length on waterline	114 feet	
Beam	25 feet	6 inches
Depth	8 feet	
Draft	4 feet	10 inches

On the main deck, in addition to the usual open freight space forward, there is an enclosed freight deck amidships, while aft are the dining room and galley. The quarters for the engineer, purser's office and the men's toilet are also on this deck.

On the upper deck there is a long central deckhouse amidships, with ladies' rest room at the after end, and also a very considerable amount of promenade and lounging space, both on each side of the deckhouse and at the after end, all this space being covered by an awning deck.

The pilot house, with quarters for the captain and mate, is forward on top of the awning deck. Accommodations for the crew are below in the forecastle.

The machinery equipment consists of two 4-cylinder heavy duty oil engines built by the Kahlenberg Brothers Company, having a bore of 10 inches and a stroke of 10½ inches, which will deliver 120 brake horsepower each at 340 revolutions per minute.

This new boat will be completely equipped in every respect, the auxiliaries including an unusually efficient outfit of pumps, electric light plant and all equipment necessary for a craft of this type.

The general appearance of the new boat will be attractive, as she has pleasing lines, and with a large center stack, used for ventilation and exhaust, will present an attractive and workman-like appearance. This boat will be delivered to her new owners this month and will immediately be placed in active service.

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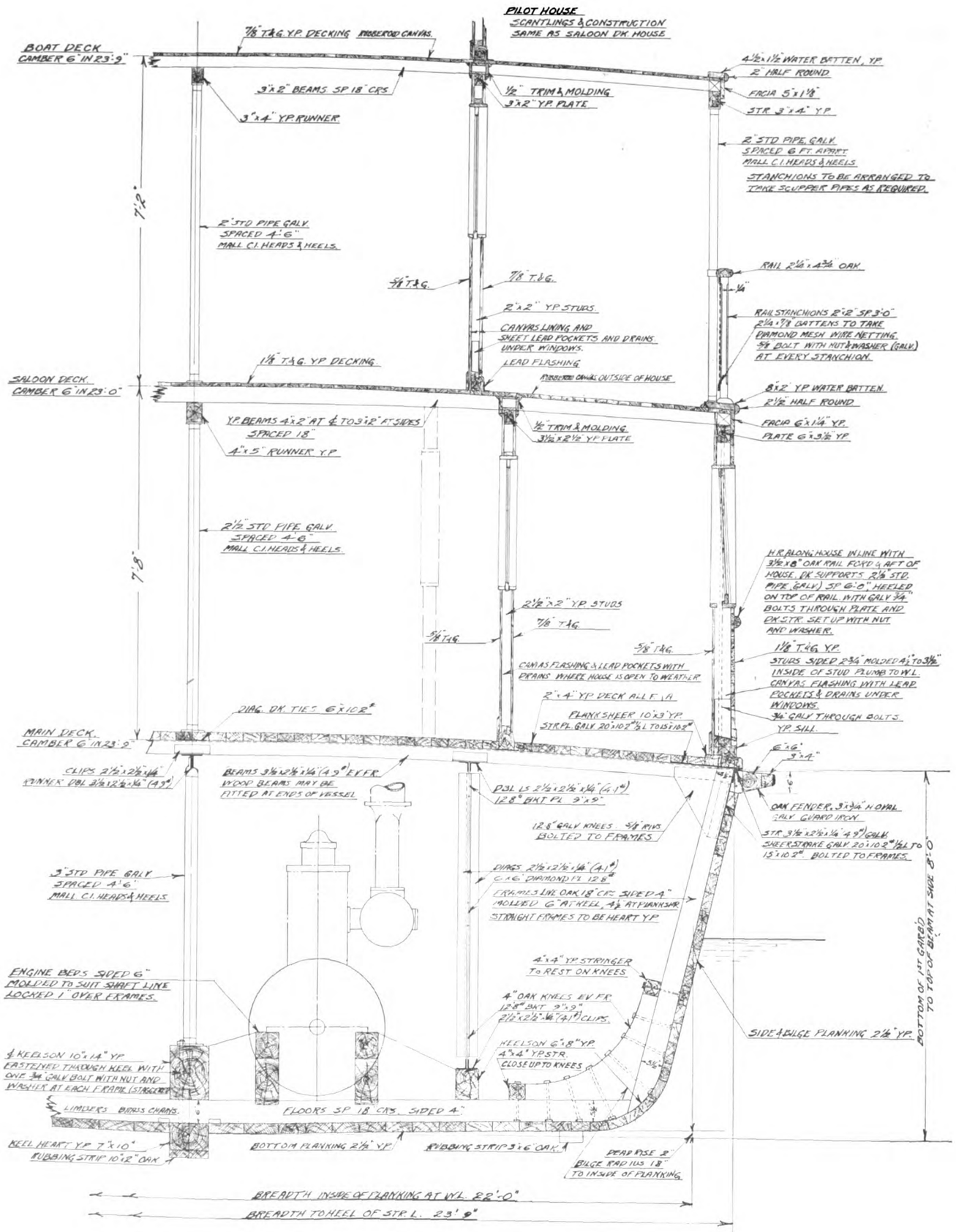
PILOT HOUSE
SCANTLINGS & CONSTRUCTION SAME AS SALOON DK HOUSE
BOAT DECK CAMBER 6" IN 23'-9"
7/8" T.&G. YP. DECKING FIBREFOID CANVAS.
3"x2" BEAMS SP 18" CRS.
3"x4" YP RUNNER
1/2" TRIM & MOLDING 3"x2" YP. PLATE
4½"x1½" WATER BATTEN, YP 2 HALF ROUND
FACIA 5"x1⅛"
STR 3"x4" YP
2" STD PIPE GALV. SPACED 6 FT. APART MALL C.I. HEADS & HEELS
STANCHIONS TO BE ARRANGED TO TAKE SCUPPER PIPES AS REQUIRED.
7'-2"
2" STD PIPE GALV. SPACED 4'-6" MALL C.I. HEADS & HEELS
5/8" T.&G.
7/8" T.&G.
2"x2" YP STUDS
CANVAS LINING AND SHEET LEAD POCKETS AND DRAINS UNDER WINDOWS.
LEAD FLASHING
RAIL 2½"x4½" OAK
¼"
RAIL STANCHIONS 2"x2" SP. 3'-0"
2¼"x⅞" BATTENS TO TAKE DIAMOND MESH WIRE NETTING.
⅝" BOLT WITH NUT & WASHER (GALV.) AT EVERY STANCHION
1⅛" T.&G. YP DECKING.
SALOON DECK CAMBER 6" IN 23'-0"
FIBREFOID CANVAS OUTSIDE OF HOUSE
8"x2" YP WATER BATTEN
2½" HALF ROUND
FACIA 6"x1¼" YP.
PLATE 6"x3½" YP
YP BEAMS 4"x2" AT ℄ TO 3"x2" AT SIDES SPACED 18"
4"x5" RUNNER YP
½" TRIM & MOLDING 3½"x2½" YP PLATE
7'-8"
2½" STD PIPE GALV. SPACED 4'-6" MALL C.I. HEADS & HEELS
H.R. SALOON HOUSE IN LINE WITH 3½"x8" OAK RAIL FOR'D & AFT OF HOUSE. DK SUPPORTS 2⅛" STD. PIPE (GALV.) SP 6'-0" HEELED ON TOP OF RAIL WITH GALV ¾" BOLTS THROUGH PLATE AND DK. STR. SET UP WITH NUT AND WASHER.
2½"x2" YP STUDS
7/8" T.&G.
5/8" T.&G.
5/8" T.&G.
1⅛" T.&G. YP. STUDS SIDED 2¾" MOLDED 4½" TO 3½" INSIDE OF STUD PLUMB TO W.L.
CANVAS FLASHING & LEAD POCKETS WITH DRAINS WHERE HOUSE IS OPEN TO WEATHER
CANVAS FLASHING WITH LEAD POCKETS & DRAINS UNDER WINDOWS.
¾" GALV THROUGH BOLTS
YP. SILL
2"x4" YP DECK ALL F. \A
PLANK SHEER 10"x3" YP STR PL GALV 20"x10 7/16" L TO 15"x10 8"
2 DKG. DK. TIES 6"x10 2"
MAIN DECK CAMBER 6" IN 23'-0"
6"x6" 9"x4"
CLIPS 2½"x2½"x½" (4.9#) KINNEE DBL 3½"x12½"x½" (14.9#)
BEAMS 3½"x2½"x½" (4.9#) EV FR WOOD BEAMS MAY BE FITTED AT ENDS OF VESSEL
P31 LS 2½"x2½"x½" (6.1#) 12.8" BKT PL 3"x9"
12.8" GALV KNEES 5/8" RIVS BOLTED TO FRAMES
OAK FENDER, 3"x3¼" H OVAL GALV GUARD IRON
STR 3½"x2½"x¼" 4.9# GALV SHEERSTRAKE GALV 20"x10 2" TO 15"x10 2" BOLTED TO FRAMES
3" STD PIPE GALV SPACED 4'-6" MALL C.I. HEADS & HEELS
DIAGS 2½"x2½"x½" (4.1#) C.A.6" DIAMOND PL 12.8#
FRAMES 3 LYL OAK 18" CTS SIDED 4" MOLDED 6" AT KEEL, 4½ AT P'MANSHIP STRAIGHT FRAMES TO BE HEART YP
BOTTOM OF 1ST GIRD TO TOP OF BEAM AT SHR 8'-0"
4"x4" YP STRINGER TO REST ON KNEES
ENGINE BEDS SIDED 6" MOLDED TO SUIT SHAFT LINE LOCKED 1" OVER FRAMES.
4" OAK KNEES EV FR 12.8" BKT 3"x3" 2½"x2½"x½" (7.1#) CLIPS.
KEELSON 6"x8" YP 4"x4" YP STR. CLOSE UP TO KNEES
SIDE & BILGE PLANKING 2½" YP.
½ KEELSON 10"x14" YP EASTENED THROUGH KEEL WITH ONE ¾" GALV BOLT WITH NUT AND WASHER AT EACH FRAME (STAGGERED)
LIMBERS BANDS CHAINS
FLOORS SP 18" CRS. SIDED 4"
KEEL HEART YP 7"x10"
RUBBING STRIP 10"x2" OAK
BOTTOM PLANKING 2½" YP.
RUBBING STRIP 3"x6" OAK
BEAD RISE 2" BILGE RADIUS 18" TO INSIDE OF PLANKING
BREADTH INSIDE OF PLANKING AT W.L. 22'-0"
BREADTH TO HEEL OF STR. L. 23'-8"

M. S. Jeannette Scott: Midship Section

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Ropes, Chains and Blocks for Shipbuilding Purposes

By Horace Holden Thayer*

Continuation of a series of articles containing information regarding shipbuilding materials and their uses that is not readily obtainable from shipbuilding handbooks and other generally available sources. The articles are not intended to be a complete exposition of the subject but will be found to contain items of value to the various classes of workers in this field who have to deal with these materials from the materials' point of view.

BOTH wire and vegetable fiber ropes are made of several different materials and made up in various ways, to satisfy special requirements of strength, flexibility and wear. The relative merits of the different materials and the different ways of making them up into ropes are clearly set forth by the rope manufacturers, whose catalogs are valuable text books on the general subject. We are, however, particularly concerned with ship operating requirements, and will call attention to some of the more important considerations in this line which affect the selection of the different ropes, etc. This can be best done by dealing with them under the headings of the specific services.

Chains and blocks will be referred to under the headings where they are likely to be met with, the latter being considered particularly with reference to the ropes or chains that they have to accommodate.

Sizes given refer to ordinary merchant ship practice unless otherwise stated.

Wire Rope

When dealing with wire rope the chief considerations are strength and flexibility. The three main classifications are plow steel, cast steel and iron, the first mentioned being the strongest and the last, which is seldom required for shipboard service, being the weakest. Wire rope usually has a hemp core and in some cases each strand has a hemp core.

The purpose of this core is to increase the flexibility of the rope, to retain a lubricant which adds to the life of the rope and also to minimize internal friction from contact of the wires with each other. A mixture of a heavy bodied oil and black lead makes a good lubricant, and running ropes should be kept lubricated.

The flexibility is largely a question of the size of the individual wires used. A rope with 6 strands and 7 wires to a strand is as stiff a rope as is regularly made, and one with 6 strands and 37 wires to a strand is extra pliable. The last mentioned rope in the sizes generally met with on shipboard has wires a little too fine to withstand the abrasion of shipboard service.

Where strength and flexibility are both important factors the plow steel rope should be used rather than a larger diameter cast steel rope of equivalent strength. In some special cases bronze ropes are required. Wire ropes are often referred to as 6 x 7 rope, 6 x 19 rope, etc., the first figure being the number of strands and the second the number of wires per strand. When ordering wire rope it is well to specify that all unworked ends shall be well served.

Tables I to V inclusive give the minimum ultimate strengths that some of the wire ropes referred to later on in this article should possess. These or greater values can be readily furnished by the wire rope manufacturers. Weights can be obtained from the manufacturers' catalogs. A factor of safety of at least 5 should be used.

There is a proprietary wire rope, called "Durable," wire rope in which each strand of wires is served with a tarred hemp marline, the rope also having the customary hemp center. The serving reduces the friction between the strands and protects the wires from corrosion. The wires are not galvanized. The rope is very flexible and has found considerable favor where this factor is most important.

Fiber Rope

Fiber rope is made principally from Manila hemp, Russian, Italian and American hemp and sisal fibers. Manila, which botanically is not a hemp fiber, is much superior to the others in length, strength and lasting qualities, and is universally selected for marine purposes. Tarred hemp is

Table I—Galvanized Steel Wire Rope, 6 x 24 Construction, (7) Hemp Centers.

Diameter, inches	Circumference, inches	Ultimate Strength, pounds per sq. in.
1	3	50,000
1 1/16	3 1/4	54,000
1 1/8	3 1/2	64,000
1 3/16	3 3/4	74,000
1 1/4	4	84,000
1 3/8	4 1/4	92,000
1 7/16	4 1/2	100,000
1 1/2	4 3/4	110,000
1 5/8	5	122,000
1 11/16	5 1/4	135,000
1 3/4	5 1/2	150,000
1 13/16	5 3/4	165,000
1 7/8	6	180,000

Table II—Galvanized Cast Steel Wire Rope, 6 x 7 Construction

Diameter, inches	Circumference, inches	Ultimate Strength, pounds per sq. in.
3/8	1 1/8	8,200
7/16	1 1/4	10,000
1/2	1 1/2	14,000
9/16	1 3/4	18,000
5/8	2	23,400
3/4	2 1/4	33,600
13/16	2 1/2	38,000
7/8	2 3/4	44,000
1	3	56,000
1 1/16	3 1/4	62,000
1 1/8	3 1/2	68,000
1 3/16	3 3/4	76,000
1 1/4	4	84,000
1 3/8	4 1/4	95,400
1 1/2	4 1/2	113,000

Table III—Galvanized Cast Steel Wire Rope, 6 x 19 Construction

Diameter, inches	Circumference, inches	Ultimate Strength, pounds per sq. in.
1 3/4	5	129,000
1 3/4	5 1/2	153,000
1 7/8	5 3/4	172,000
2	6 1/4	190,000

Table IV—Galvanized Plow Steel Wire Rope, 6 x 19 Construction

Diameter, inches	Circumference, inches	Ultimate Strength, pounds per sq. in.
3/8	1 1/8	10,300
7/16	1 1/4	14,000
1/2	1 1/2	18,000
9/16	1 3/4	22,100
5/8	2	27,900
3/4	2 1/4	41,400
7/8	2 3/4	52,200
1	3	68,400
1 1/8	3 1/2	84,600

Table V—Galvanized Cast Steel Wire Rope, 6 x 19 Construction

Diameter, inches	Circumference, inches	Ultimate Strength, pounds per sq. in.
3/8	1	5,500
1/2	1 1/8	8,400
7/16	1 1/4	10,000
1/2	1 1/2	14,000

* Member of the firm of Rossell & Thayer, naval architects and marine engineers, Philadelphia, Pa.

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Table VI—Common Lay Three-Strand Manila Rope. Approximate Gross Weight and Strength

Name and Size in Circumference	Approx. Diameter	Approx. Length and Weight, Standard Coil: Feet	Approx. Length and Weight, Standard Coil: Pounds	Approx. Tensile Strength, New Manila Rope	Length of Rope in One Pound	Weight per Foot, in Pounds
6 thd. ¾"	¼"	2,750	50	700	55' 0"	.018
9 thd. 1"	⅜"	1,820	50	1,100	36' 4"	.027
12thd. 1⅛"	⅜"	1,350	50	1,500	27' 0"	.037
1¼"	7/16"	1,200	65	1,800	18' 6"	.054
1⅜"	½"	1,200	75	2,000	16' 0"	.063
1½"	½"	1,200	90	2,500	13' 4"	.075
1¾"	⅝"	1,200	125	3,000	9' 7"	.104
2"	⅝"	1,200	160	4,000	7' 6"	.133
2¼"	¾"	1,200	198	5,000	6' 1"	.165
2½"	⅞"	1,200	234	5,550	5' 1"	.195
2¾"	⅞"	1,200	270	6,600	4' 5"	.225
3"	1"	1,200	324	7,800	3' 8"	.270
3¼"	1 1/16"	1,200	378	9,200	3' 2"	.315
3½"	1⅛"	1,200	432	10,500	2' 9"	.360
3¾"	1¼"	1,200	504	12,200	2' 5"	.420
4"	1⅜"	1,200	576	13,700	2' 1"	.480
4¼"	1⅜"	1,200	648	14,900	1' 10"	.540
4½"	1½"	1,200	720	17,400	1' 8"	.600
4¾"	1⅝"	1,200	810	19,000	1' 6"	.667
5"	1 5/8"	1,200	900	21,800	1' 4"	.750
5¼"	1¾"	1,200	1,080	27,700	1' 1"	.900
6"	2"	1,200	1,296	31,600	11"	1.08
6¼"	2⅛"	1,200	1,512	33,500	9½"	1.26
7"	2⅜"	1,200	1,764	36,200	8"	1.47
7½"	2½"	1,200	2,016	42,300	7"	1.68
8"	2¾"	1,200	2,304	47,300	6¼"	1.92
8½"	2⅞"	1,200	2,590	54,200	5½"	2.16
9"	3"	1,200	2,915	60,000	5"	2.43
9½"	3⅛"	1,200	3,240	67,000	4½"	2.70
10	3¼"	1,200	3,600	74,200	4"	3.00

desirable for some special ropes of small diameter; other special lines are made of cotton. A yarn or thread is first made up of a number of fibers twisted together, then the strand is made up of two or more yarns twisted together in the opposite direction; the rope is formed of three or more strands twisted together in the opposite direction to the twist in the strands. A 3-strand rope is stronger than a 4-strand rope of the same size. A cable is made up of three or four of these ropes twisted together in the opposite direction to the twist in the ropes. It is not as strong as a plain laid rope of equal diameter but is more elastic and stands greater surface wear.

The strength of a rope is dependent to some extent upon the amount of twist or "lay" in it. The softer the lay, the stronger the rope, but the less the wearing qualities. The softer lays are generally desired for marine purposes. An extra strength rope obtained by a careful selection and preparation of the fibers, the use of finer fibers and a finer spinning of the threads or yarns is called bolt rope. It is a better wearing rope than the ordinary grade. Its lay is generally soft.

The general run of ropes on shipboard are of the 3-strand variety. Ropes at the Boston Navy Yard are made only in 3 strands from 3-inch circumference down, and are made in 4 strands from 3¼-inch circumference up unless specially ordered 3 strands. Four strand rope is made either with or without a center core. The latter is the marine type and has generally a softer lay than the former. Four strand rope costs somewhat more than three strand rope per pound and is from 5 to 7 percent heavier.

Table VI gives considerable data regarding the strength and other properties of Manila rope. The strengths are in accordance with Navy Department specifications and are generally somewhat lower than average strength figures for Manila rope furnished by the rope manufacturers. A factor of safety of at least 5 should be used.

Fiber rope is oiled for preservative purposes with a petroleum base oil. The finished rope should show under chemical analysis not over 12 percent of oil.

When ordering Manila rope it is well to call for a medium lay for marine purposes, to specify the circumference and strength and to require the ends of the rope to be whipped in such a manner as to prevent the unlaying of the rope when in use.

Some of the smaller ropes or "fittings" called for in ship specifications are apt to give more trouble in the determination of just what is required than the larger and more important ropes; and as they will be referred to later it will be well to define them here. They are almost always tarred and when ordered are understood to be tarred unless otherwise called for.

Houseline is a three thread hemp cord bought by the pound and running about 160 feet to the pound.

Marline is a two thread hemp cord which runs about 222 feet, 360 feet and 520 feet to the pound. The medium

Table VII—Bradlee & Co.'s Chain. Pitch, Breaking, Proof and Working Strains

Size of Chain	Dist. From Cen. of One Link to Cen. of Next	Wt. Per Ft. in Lbs., Approx.	Outside Width	D. B. G. Special Crane: Proof Test, Lbs.	D. B. G. Special Crane: Average Breaking Strain, Lbs.	D. B. G. Special Crane: Ordinary Safe Load, General Use, Lbs.	Crane: Proof Test, Lbs.	Crane: Average Breaking Strain, Lbs.	Crane: Ordinary Safe Load, General Use, Lbs.
¼	1	¾	½	1,932	3,864	1,288	1,680	3,360	1,120
⅝	1	1	1⅛	2,898	5,796	1,932	2,520	5,040	1,680
⅜	1	1⅓	1⅝	4,186	8,372	2,790	3,640	7,280	2,427
½	1	2	1½	5,796	11,592	3,864	5,040	10,080	3,360
⅝	1	2½	1⅞	7,728	15,456	5,152	6,720	13,440	4,480
¾	1	3 3/10	2	9,660	19,320	6,440	8,400	16,800	5,600
⅞	1	4 1/10	2⅜	11,914	23,828	7,942	10,360	20,720	6,907
1	1	5	2⅝	14,490	28,980	9,660	12,600	25,200	8,400
1¼	1	6 2/10	2⅞	17,388	34,766	11,592	15,120	30,240	10,080
1½	2	6 7/10	3¼	20,286	40,572	13,524	17,640	35,280	11,760
1¾	2	8	3⅝	22,484	44,968	14,989	20,440	40,880	13,627
1⅞	2	9	3⅞	25,872	51,744	17,248	23,520	47,040	15,680
1	2	10¼	4¼	29,568	59,136	19,712	26,880	53,760	17,920
1⅛	2	11	4½	33,264	66,538	22,176	30,240	60,480	20,160
1¼	2	13 5/6	4⅞	37,576	75,152	25,050	34,160	68,320	22,773
1⅜	3	13 7/10	5	41,888	83,776	27,925	38,080	76,160	25,387
1½	3	16	5⅜	46,200	92,400	30,800	42,000	84,000	28,000
1⅝	3	16½	5⅝	50,512	101,024	33,674	45,920	91,840	30,613
1¾	3	19¼	6⅛	55,748	111,496	37,165	50,680	101,360	33,787
1⅞	3	19 7/10	6¼	60,368	120,736	40,245	54,880	109,760	36,587
2	3	23	6⅝	66,528	132,056	44,352	60,480	120,960	40,320
2⅛	4	25	6⅞	70,762	141,524	47,174	65,520	131,140	43,180
2⅛	4	28	7⅛	74,382	148,764	49,588	.....	.....	.....
2⅛	4	30	7⅜	78,733	157,466	52,488	.....	.....	.....
2¼	4	31	7⅝	82,320	164,640	54,880	.....	.....	.....
2⅜	5	33	7⅞	88,256	176,512	55,504	.....	.....	.....
2⅜	5	35	8⅛	94,360	188,720	62,906	.....	.....	.....
2½	5	38	8⅜	100,800	201,600	67,200	.....	.....	.....
2⅝	5	40	8⅝	107,520	215,040	71,680	.....	.....	.....
2¾	6	43	8⅞	114,240	228,480	76,160	.....	.....	.....
2¾	6	46	9⅛	121,240	242,480	80,823	.....	.....	.....
2⅞	6	49	9⅜	128,576	257,152	85,750	.....	.....	.....
2⅞	6	52	9⅝	136,080	272,160	90,720	.....	.....	.....
3	6	58	9⅞	151,580	303,160	101,053	.....	.....	.....
3⅛	7	64	10⅛	168,000	336,000	112,000	.....	.....	.....
3⅛	7	70	10⅜	180,544	361,088	120,362	.....	.....	.....
3¼	7	73	10⅝	193,088	386,176	128,725	.....	.....	.....
3⅜	7	76	10⅞	205,408	410,816	136,938	.....	.....	.....
3	7	86	10⅞	217,728	435,456	145,152	.....	.....	.....

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weight is most serviceable about a steamship. It is bought by the pound.

Ratline is a hemp rope which ranges in size by three thread intervals from 6 threads, ¾-inch circumference, to 24 thread, 1⅝-inch circumference. It is always designated by the number of threads and comes in coils of 1,200 feet length. The 15-thread ratline, 1¼-inch circumference, is a very usual size. A coil of this rope weighs 90 pounds.

Roundline and hambpoline are three thread hemp cords which run about 92 feet to the pound. They are of opposite twist. They are bought by the pound.

Seizing is made like ratline and designated in the same manner by the number of threads, but it is ordered by the pound. The sizes are 6-thread which runs 58 feet to the pound, 9-thread which runs 40 feet to the pound, and 12-thread which runs 29 feet to the pound.

Spun yarn is made of two hemp threads running about 93 feet to the pound, and of three threads running about 77 feet to the pound. It differs from the other tarred fittings in not having so much twist in the threads or yarns. The 3-yarn variety is usually most serviceable. It is bought by the pound.

CHAIN

When dealing with chain the principal considerations are the nature of the chain and strength.

The principal chains met with on shipboard are stud link chain and short link or "Crane" chain. The former is used only for anchor chain cables. The type of chain called "Coil" chain is somewhat used; and it has slightly less links per fathom than the crane chain.

Crane chains are of different grades according to the quality of the iron used in them and in some cases according to the shortness of the links, the strongest chains having slightly more links per fathom than those of lower grade.

Standard proportions for stud link chains and suitable strengths for both the stud link and the short link chains of different sizes can be obtained from the classification society rules and tables, and these are values which chain makers have to live up to.

Table VII gives data regarding the short link chain made by Bradlee & Company. This is selected for reference because the proof test and breaking strain of the "crane" chain are for most sizes identical with the proof test and break test required for short link chains by the American Bureau of Shipping. Strength figures of other manufacturers are in some cases higher than those in the table. It will be noted that a factor of safety of 3 is recommended. In other cases this factor is recommended for the "Special Crane" chain and a factor of safety of 4 for the lowest grade of "Crane" chain and for "Coil" chain. The facter to use in any case depends upon the nature of the work. With chain used in a purchase for lifting or moving loads it is desirable to add about ⅓ to the estimated pull on the line for friction.

It is especially desirable that chains around drums or sheaves have short links in order to lie close without risk of bending.

Anchor chain cables of 1-inch or more diameter of iron are usually of stud link chain and where a vessel is classed stud link chains as small as 11/16-inch are called for.

Anchor chain cables 1⅜-inch and over in diameter may be made of cast steel as well as of wrought and welded links, the former having received classification society approval in 1918, and also having stood up well in service.

BLOCKS

Blocks for marine use should be of substantial construction. The general practice is to use steel blocks with wire ropes and wood blocks with fiber ropes. The latter should be of the heavy, wide mortise, double cross bolted type, with shell of well seasoned ash reinforced with inside iron straps. On small blocks for yachts, etc., the shell is sometimes of lignum vitæ. Wide mortise steel blocks can be obtained for fiber ropes and all gin blocks are of iron or steel. The bushings are selected according to the service; desirable bushings for the different services will be found noted under the respective headings. Blocks can be obtained with a great variety of shackles, hooks, jaws, eyes, eyebolts, etc., to meet the particular requirements of the service. Some general requirements for shipboard use are:

All blocks to have metal sheaves.

All steel blocks and the ironwork of all wood blocks to be galvanized.

Sheaves in all blocks to be suited to the rope or chain. With rope the diameter of the groove at the tread should be 1/16 inch greater than the diameter of the rope.

Upset shackles to have heart thimbles.

Steel blocks are usually specified according to the size of the sheave and wood blocks according to the size of the shell.

With wire ropes it is important that the sheave diameters be of ample size so as not to cause rapid wear of the ropes. The wire rope manufacturers recommend that the sheave diameter be at least 20 times the diameter of the rope and in their catalogs call for considerably larger sizes to suit the differing degrees of flexibility of the ropes. The Navy Department specifications call for 15 diameters or more. In ordinary merchant ship work, rope economy is often sacrificed to convenience, but good practice with wire rope calls for the use of sheaves about 20 times the diameter of the rope.

Wood blocks generally run about 14 inches for 4½-inch circumference fiber rope, 12 inches for 4-inch rope, 10 inches for 3½-inch and 3-inch rope, 8 inches for 2¾-inch and 2½-inch rope, 7 inches for 2¼-inch and 2-inch rope, 6 inches for 1½-inch rope, 4 inches for 1⅛-inch rope, etc.

Sheaves or drums for chains are preferably 30 or more times the diameter of the chain, but this generally cannot be provided for on shipboard.

Where block shackles have to connect to bands, etc., it is important to provide that the shackles and pins are of the proper size.

In services where a purchase is desirable the blocks and ropes have to be considered together and a proper selection made of both. For instance, with the lead off of the upper block and the weight on the lower block, a combination of two double blocks with a becket on the upper one will cause a pull on the rope of one-fourth of the weight, whereas, with a triple upper block and a double lower block with a becket on the latter the pull on the rope will be only one-fifth of the weight. There would of course be an additional pull due to friction in each case.

ACCOMMODATION LADDER

Accommodation ladder falls are preferably of fiber rope, for easy handling. With the usual run of cargo ship ladders, 2¾-inch Manila with a 10-inch double block below and a 10-inch triple block above makes a good combination. On some small ladders 8-inch double and single blocks are used with the same size rope. The upper block has a loose hook and no becket; the lower block has a loose front hook and a becket. Graphite bronze bushings are desirable.

ANCHOR LIGHT

Manila rope 1⅛-inch circumference will usually answer for this, with 4-inch single wood block with regular shackle and graphite bronze bushing.

AWNINGS

Wire rope for the support of awnings is preferably ⅜-inch diameter, galvanized cast steel, 6 by 19 construction, with ultimate strength as given in Table V.

DREDGE CHAINS

Dredge chains for various operating services are subject to hard usage and should be of the highest grade of short link chain.

(To be continued)

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Questions and Answers Relating to Naval Architecture and Marine Engineering

Conducted by James L. Bates, Naval Architect, and W. B. Newton, Marine Engineer

This department is maintained for the purpose of answering all questions relating to ships and their machinery. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Propeller Problem

Q. (1171).—I have been following with interest the excellent articles of Admiral Dyson, especially his latest exposition of the propeller problem. In this connection I have come across a difficulty in the solution of the problem of the double ended ferry boat discussed in MARINE ENGINEERING AND SHIPPING AGE, I believe, during the early part of 1921. I cannot give the date as it was cut off in careless clipping.

After having derived the basic I.H.P. and E.H.P. for the 210-foot ferry, the author proceeds as follows:

$v=12.73$	12.73
$v/V=0.67$ (12.73/19)	0.789 (12.73/16.14)
Log $Av=3.82$	.....
$Av=6500$	4093
Log $Av=3.15$	.....
$Av=1380$	3043
$Nv=147.9$	147.9
$(1-s)=0.9135$	0.9135
$s=0.0865$	0.0865
$I.H.P._A=s\frac{I.H.P._v}{S.Av}=1020$	787
$K=1.36$	$M_r=1.05$
$I.H.P._p=I.H.P._A/K=750$	$787/1.05=750$
$10^x=I.H.P./I.H.P._A=5.105$	5.105
$Z=0.7334^2$	
e.h.p./E.H.P. = for Z, 0.209	

Now, in Dyson's new method, Z_v for $v/V=0.67$ is 0.4, not 0.67 (which latter is obtained from $Z_v=(Av-Av)$. How can the two be reconciled? Again, for $10^x=5.105$, the log, which gives $Zp=.708$ and for this e.h.p./E.H.P. is not 0.209. Is this correct?

Lastly, what is M_R? Dyson makes no mention of it.

In an article by Mr. Bates, second trial, Apr. 1921, p. 336, he begins by selecting (e.h.p./E.H.P.)g. Dyson uses e.h.p./E.H.P. Is this correct?

In Dyson's Fig. 2, for values H/B greater than standard, how are the direction lines obtained? Doubling the H/B value shows a corresponding point to be at BC=2/3 original BC. Is this purely accidental?

A. (1171).—The original curves of A_v and A_v were plotted on actual speeds from the trials of a few ships. As Admiral Dyson's investigations proceeded he found that, when the performance of other vessels were applied, inconsistencies in revolutions appeared which could not be accounted for and he saw that some other method of obtaining them was necessary. So instead of using the actual speeds as a basis, a speed ratio was decided upon from actual performances of many vessels and up to the present time has proven to give consistent results. This curve bears no relation to the original curves.

For the Z_p value of 0.708 I can see no reason why the correct reading of e.h.p./E.H.P. should not be 0.209.

M_r was a corrective factor for indicated horsepower and revolutions where the values of e.h.p./E.H.P. and $^v/_V$ obtained from the analysis of the estimated or actual performance of a propeller plotted on the cavitation chart showed cavitation existed. This M_r factor is no longer used in these calculations.

By starting with gross load fraction values of (e.h.p./E.H.P.)g much work is often eliminated, especially when it becomes necessary to design fairly close to the cavitation region, as we are certain at the start that the load fraction e.h.p./E.H.P. of the actual propeller when the value of K is applied will not put the propeller into cavitation.

The fact that doubling the value of H/B decreases the original BC by 2/3 was accidental, also interesting.

Derivation of Resistance Constant

Q. (1174).—On page 641 of MARINE ENGINEERING AND SHIPPING AGE, October, 1922, in the article, "Resistance of Ships to Propulsion," by A. J. C. Robertson, is given the following formula:

$$\text{Resistance constant } (C) = \frac{1.3115\ R}{\Delta^{2/3} v^2}$$

Can you indicate to me how the constant 1.3115 in above formula is obtained?

A. (1174).—The resistance constant $(C) = 427.1 \frac{\text{E.H.P.}}{V^3 \Delta^{2/3}}$

$$(1)\quad (C) = \frac{427.1\ \text{E.H.P.}}{V} \times \frac{1}{V^2 \Delta^{2/3}}$$

$$(2)\quad \text{E.H.P.} = \frac{R \times V \times 101.33}{33{,}000}$$

Substituting the value of E.H.P. given by equation (2) in equation (1)

$$(C) = \frac{R\ V}{V} \times \frac{101.33}{33{,}000} \times 427.1 \times \frac{1}{V^2 \Delta^{2/3}}$$

$$(C) = \frac{1.3115\ R}{V^2 \Delta^{2/3}}$$

Motorships vs. Steamships

Q. (1175).—I am much interested in the Diesel engine for marine purposes and have been for years. Do you not think our shipbuilders and owners are failing to serve their own best interests by clinging to the steam engine in its various forms? Should they not even in vessels of fair speed and size turn to the Diesel?

A. (1175).—This is too large a subject to handle satisfactorily in this department. The following suggestions are believed worthy of note but are by no means considered to cover the subject.

The Diesel engine is at present essential to and is used successfully in the submarines of all navies. It is used successfully in powers up to 2,000 or 2,500 per unit in many modern cargo vessels. During the past several years a number of large private yachts have been furnished with this type of machinery. Passenger liners 500 feet in length with speeds of 13½ knots and Diesel engines of 6,000 horsepower are under construction. The writer understands that all the large shipbuilding companies of this country are now prepared to furnish and install this type of machinery. This fact of itself testifies to a recognition of its possibilities.

So much for what has been and what is being done. The Diesel engine, while very economical of fuel, while operating with a smaller force of men than other types of machinery and while eliminating the steam boiler entirely except for heating is of great first cost, requires the attention of specially trained engineers, is relatively very heavy and at present is limited in power to units of say 4,000 to 5,000 horsepower. Perhaps we know too little as yet to make comment on the size of the repair bill for this type as compared with that of others.

The selection of the machinery installation for a ship is a matter of careful consideration resolving itself finally into the old question of the return on the investment.

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Your attention is invited to the following articles published in MARINE ENGINEERING AND SHIPPING AGE:

"Cargo Motorship versus Steamship," by Chas. E. Lucke, September and October numbers, 1920.

"Internal Combustion Engines Applied to Propulsion," by John F. Metten and J. C. Shaw, July, 1921.

"Diesel Electric Propulsion," by J. B. Bassett, August, 1921.

"Diesel versus Steam Drive," by J. E. P. Grant, May, 1922.

NEW BOOKS

Burning Liquid Fuel

Reviewed by J. A. Kelley*

BURNING LIQUID FUEL. By William N. Best. Size, 6 by 9 inches. Pages, 336. Illustrations, 316. New York, 1922. U. P. C. Book Company, Inc.

"Burning Liquid Fuel" purports to be "a practical treatise on the perfect combustion of oils and tars, giving analysis, calorific values and heating temperatures of various gravities with information on the design and proper installation of equipment for all classes of service."

Briefly, the author opens with reminiscences dating back to his earliest experiences in the West in 1887, followed by profuse tables of oil production, taken mainly from Geological Survey reports. In the chapter on atomization, the author states that all burners may be grouped in three distinct classes, *viz.*: "mechanical, internal mixing and external mixing." He then describes the merits of the type of burner manufactured by himself—which is, of course, in the external mixing class, whereby oil at about twelve pounds pressure is fed into a sheet blast of steam at boiler pressure or compressed air. Incidentally, a photograph is included entitled *mechanical burner*. The author claims that "with low pressure or volume air you are limited to the use of light oils, whereas with compressed air or steam as atomizer, you can use any gravity of crude oil, fuel oil, kerosene or tar, which will flow through a one-half inch pipe." The writer checked back to verify that this book came off the press in 1922, yet all marine men know full well that the Shipping Board standard bunker oil is 14-16 Baumé and that all marine installations, except in a few minor instances, are of the mechanical type of atomization. Adaptions of the *Best system* are described, which permit the use of pulverized coal, thereby opening up the opportunity for the economical use of a fuel which otherwise is wasted or inefficiently used. Tables dealing with the quantity of steam lost in atomizing per boiler horsepower hour are conspicuous by their absence.

The chapter on *oil systems* includes many diagrams of typical piping installations for land use with attendant suggestions and directions, together with photographs of fittings used by the author. A description of a centrifugal air compressor, operated by a condensing turbine, is also included, which is recommended for marine use, with the view to eliminating the necessity for additional boiler make-up, which the steam blast requires.

The remainder of the book is devoted to particular installations and usages, including locomotive equipment, stationary and marine boilers, low pressure boilers and hot air furnaces, commercial gas industry, sugar industry, steel foundry, heat treating, malleable iron, grey iron and brass foundry and forge shop practice, boiler manufacturers' furnace, copper industry, enameling, chemical industry, ceramic, lime and cement equipment, dryers, ore roasters, bread and cracker ovens, chocolate industry, oil and tar still, incinerator and glass industry equipment.

Under *Marine Boilers* all that can be found is a rather illegible diagram, on page 94, attempting to show the *Best burner* adapted to a Scotch marine furnace, with no descriptive matter amplifying. The chapters on oil burning in the various lines of industry, enumerated above, are quite replete with diagrams (there are 316 sketches in the book) and the salient points in the several installations are covered, as well as the general claim for the superiority of oil over coal in each case.

Tucked away under the heading of *Modern Forge Shop Practice*, the author digresses into quite an eulogy on oil, the superb fuel, in which he points out that the power of a nation depends on its conservation of oil. He says, "I hope that the heat from this fuel will be tempered by love so that it may be a nation which will use its power for good, governing with righteousness its people and bringing a reign of peace to the world. . . . Unfortunately the World War has created a demand for this fuel in marine service and our government has equipped many boilers on vessels without making any preparations for a change back from oil to coal." The author then becomes quite alarmed over the shortage of fuel oil for the industries, particularly forge shops, and "sees no reason why the Navy should use oil, if this fuel is in such demand by the manufacturers of our country. . . ." (page 218).

After resuming the subject of oil burning in modern forge shop practice, the author again digresses, saying (page 225), "I am well aware that oil in marine service is attractive because of the saving effected in labor, there being no discharging of ashes, as well as the time saved in charging the fuel oil on the vessel as against the time required for loading of coal; and also the advantage of being able to increase the speed of the vessel, the cleanliness and improved sanitary conditions, as well as the fact that this fuel elevates the mind of the fireman, as his duty does not require mere brawn but brains for the scientific burning of oil, and gives him the feeling that though he is housed up in a hot boiler room (much cooler because of the use of oil as fuel), he is 'a man for a' that'." He does admit that two tugs on oil can do the work of three on coal, but seems to disregard the vital economic phase for the merchant marine. "Yet," he continues, "we must consider the use and the many advantages of this fuel for the manufacturers whose products must furnish at least part of the cargo for these vessels, else they will be operated at a loss."

After continuing with his descriptions of oil burning installation, in forge shop practice, the author, on page 227, again harps back to his theme. He says, "the men in marine service will get a new vision also, and, that is—in forging industry—oil is even more attractive than in marine boiler equipment on ocean going vessels because a great deal more labor can be saved in a forge shop than in marine service, to say nothing of the increased output and superior quality of the product from the forge shop. In times of peace oil should be used only upon as few naval boats as possible. It should be used on some vessels, however, owing to the fact that the men should be trained in the art of operating oil burners. It would be well to have the boilers of the vessels interchangeable so that they can readily be changed from coal to oil, and from oil back to coal, for in case of war oil should be used, if possible, on naval vessels. I know there are a large number of merchant vessels now being equipped with oil in order to save labor and avoid strikes. I believe that will only be used temporarily, but I am equally confident that the nation which conserves its ore and gives its manufacturers all the oil they require will be the manufacturing nation of the future."

The reader is almost led to infer that the burners coming

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under the class of "external mixing" have not received much of an ovation on the sea.

The final chapter, on *Combustion Engineering,* points out the dearth of men able to burn fuel successfully and scientifically—of *engineers in caloric,* and also discourses on vocational successes, closing with a reference to the Lincoln Memorial University of Tennessee, which he claims to be the only institution teaching scientific oil burning.

Although the author himself seems to be quite impressed with his literary contribution to the field of oil burning, the book cannot be recommended to marine engineers as having any particular value, nor of containing data for their use not already plentifully supplied in the advertising literature issued by makers of the various types of burners. The text itself is confined to a particular type of burner. Coming from the pen of Dr. Best, who is universally acclaimed as a pioneer and authority on oil burning, the book is somewhat disappointing.

It is to be regretted that the author has treated the marine field with such little notice, for the number of vessels fitted for oil burning and the large number now being fitted or contemplated shows that the marine field is worth consideration by such an authority as the author. In short, the book is an elaborate catalog advertising the author's wares.

LETTER TO THE EDITOR

Explosions on Oil Tankers

On account of the extreme hazard encountered by repair yards in the overhauling and repairs to oil tankers and vessels carrying fuel oil, also on account of the frequent resulting explosions, it becomes necessary to take the utmost precautions to prevent these accidents.

While a frequent examination for gases acts as a precautionary measure against the accumulation of the same, it very often occurs that pipe joints may not be absolutely tight, thereby allowing the escape of gases into the tanks and, in conjunction with the heavy atmospheres of summer time and saturated atmosphere of early spring and fall, the gases accumulate and lie in the extreme corners of these tanks. In other words, the tank may be entirely free from gas on first examination, while final examination may show traces of the same. To minimize the risk involved to the lowest possible point, a change in design of tank tops and bulkheads seems to be the proper point at which to start these precautions.

This change would not require to be radical, but a portable plate about 4 feet by 6 feet, with stud bolts, located near the ends of each tank would help to solve the problem. These plates could be located on the inner bottom tanks, on the sides of summer tanks, top of expansion trunk and on fore and after peak tank bulkheads, or wherever fuel oil, or cargo oil, is carried. The manhole to these tanks can be located in these portable plates and, whenever repairs are required in the tanks, an insistent demand be made that these plates be removed to allow free escape of gases and entrance of fresh air; also to allow an easy exit from same, and for an easier prosecution of the work.

If this is insisted upon by the United States Steamboat Inspection Service and by the classification societies and the underwriters, fatalities and damage will become greatly reduced; this will also result in a lower cost of repairs.

Philadelphia, Pa. H. FISHER, Superintendent, Kensington Shipyard Department, The William Cramp & Sons Ship & Engine Building Company.

PERSONAL MENTION

WILLIAM J. DU BOIS, recently with the United States Shipping Board at 45 Broadway, New York, has retired from the shipping industry, and will take up his residence at Newport, N. H. Mr. Du Bois has been connected in the marine field for twenty years, having held a chief engineer's license for nearly forty years. His activities and experience have brought him in contact with the operation of marine engines of all kinds in all parts of the world. For twelve years he was superintendent of the American Mail Steamship Company, leaving the employ of this company when its ships were transferred to the Pacific coast. His experience also includes the superintending of construction of the New York city ferryboat *Mayor Gaynor.* During the last five years he has been in the service of the United States Shipping Board, and his retirement will be considered a personal as well as a business loss to the New York division of the Shipping Board.

Wm. J. Du Bois

CAPTAIN EUGENE E. O'DONNELL, of Boston, Mass., has been elected American director of the International Shipping Service Federation.

H. JASPER COX, recently appointed principal surveyor for Lloyd's Register of Shipping in Japan, began his career in shipbuilding in 1900 when he became an apprentice at the works of Swan, Hunter and Wigham Richardson, Wallsend-on-Tyne. During his apprenticeship he pursued his professional studies at Armstrong College of the University of Durham, and in 1907 at the Royal Naval College, Greenwich. In 1909 he was appointed a surveyor on the chief ship surveyor's staff of Lloyd's Register of Shipping, London, where for six years he was principally engaged in examining survey reports and construction plans of all types of vessels. In 1915 he came to the United States to perform similar work, and in 1916, when the American committee of Lloyd's Register was formed, he was appointed assistant to the chief surveyor for the United States and Canada. In 1920 he became acting principal surveyor on the chief ship surveyor's staff and proceeded to Japan to open an office for the approval of plans for vessels building and to be built in Japan and other countries of the Orient. While in Japan he helped establish the Japanese Committee of Lloyd's Register with Mr. K. Uchida, member of the House of

H. Jasper Cox

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Peers, as chairman. Early in the present year he returned to this country to resume duties as assistant to the chief surveyor. On December 12 he will sever connections here and within a few months take up his new duties as principal surveyor for Japan.

W. J. LOVE, vice-president and general manager of the Emergency Fleet Corporation, has been placed in full charge of the North Atlantic District of the Emergency Fleet Corporation and the United States Shipping Board with headquarters in New York city. He will continue as vice-president of the Emergency Fleet Corporation, and will have in charge the management of the New York organization and supervision on behalf of the Board of the operation of all its passenger lines. Mr. Love came to the Fleet Corporation in July, 1921, recognized as one of the ablest traffic and shipping men in America. For sixteen months he has served as vice-president and trustee of the Emergency Fleet Corporation, being associated with President Smull in charge of the operation of the Government's fleet. With the combined experience of private practice and that gained in the operation of Government ships, Mr. Love will be particularly qualified to take charge of the Shipping Board's broad interests in New York.

W. J. Love

LOUIS R. FORD, who has just been appointed manager of the Diesel engineering department of the Morse Dry Dock and Repair Company, Brooklyn, N. Y., served in the United States Navy for 17 years. During this time he was assigned to special engineering duty by the Secretary of the Navy, in connection with Diesel engine work. During the war he was in charge of the maintenance of submarines operating along the Atlantic coast. In 1919 he resigned from the Navy as a lieutenant commander and accepted a position with the Worthington Pump and Machinery Corporation as consulting Diesel engineer. He resigned from this connection with the Worthington Corporation on November 30 to assume his new duties with the Morse company.

Louis R. Ford

W. B. KEENE, formerly assistant to W. J. Love, has been elected a trustee of the Emergency Fleet Corporation, and will assume management of the traffic department in the Washington office.

CARLOS DE ZAFRA, president of Seabury and De Zafra, Inc., consulting naval architects and marine engineers, has been appointed to the engineering faculty of the New York University in connection with the new Russell Sage Research Laboratory of Mechanical Engineering. He will conduct lectures on power plant engineering and carry out tests on various installations of steam, oil and electric machinery. Professor de Zafra will continue his service as a consulting marine engineer with headquarters at New York University.

H. F. ALEXANDER was re-elected president of the Pacific Alaska Navigation Company, holding company for the Pacific Steamship Company (the Admiral Line), at the annual directors' meeting.

C. N. WONACOTT, vice-president and secretary of the Atlantic, Gulf and West Indies Steamship Company has resigned to become vice-president of the Multomah Lumber and Box Company, Portland, Ore.

H. W. PARSONS, formerly with the marine department of the General Electric Company, has recently joined the marine department of the Power Specialty Company to handle the well known Foster boilers and superheaters. A native of California, Mr. Parsons was first associated with the Bay Counties Power Company. He later joined the marine department of the Southern Pacific Company of California, leaving that company to act as sales engineer for a number of marine contractors. In 1911, he joined the turbine department of the General Electric Company and was transferred to the marine department of that company at the outbreak of the war. In December, 1921, Mr. Parsons left that company to take charge of the New York office of John R. Proctor, Inc., constructing engineers, leaving there in October, 1922, to become associated with the Power Specialty Company.

H. W. Parsons

JOHN M. BORN has been appointed agent for the intercoastal service of the United American Lines at Atlanta, Ga., with offices at 1108 Candler Building.

GEORGE G. BROWNE, formerly surveyor for the American Bureau of Shipping at Havre, France, has been appointed exclusive surveyor for that organization at Panama.

LYNN W. NONES, formerly with the Griscom-Russell Company, has been appointed eastern manager of the marine department of the Diamond Power Specialty Corporation with offices at 90 West street, replacing F. W. Leahy, who lately resigned.

E. B. SADTLER, formerly with the Oscar Daniel Shipbuilding Company, is now affiliated with the Peabody Engineering Corporation, New York.

WILLIAM T. DONNELLY, consulting engineer, New York, delivered an illustrated lecture on "Safety First on Our Harbor Waters" before the Staten Island Chamber of Commerce at the Curtis Annex Auditorium, Port Richmond, New York, on Thursday evening, November 2.

H. J. FINCH, assistant to James Sinclair, Far East and Africa traffic manager for the Shipping Board, has resigned to join A. H. Bull and Company, as manager of its West African service.

GILBERT W. YARUS, until recently chief fuel inspector at the New York office of the United States Shipping Board, is now in charge of the bunkering department of the Seiler Coal Company, Inc., of 90 West street, New York.

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Shipbuilding, Reconditioning and Operation

Port Expansion, Passenger and Freight Activities and Other Notes of Interest in All Branches of the Marine Industry

Bethlehem Corporation Awarded Contract for Construction of Hudson River Line Steamer

THE contract for the construction of a new paddle wheel steel steamer for the Hudson River Day Line has been awarded the Bethlehem Shipbuilding Corporation, on a bid of $742,140. The new vessel, which was designed by J. W. Millard & Brother, naval architects, 17 State Street, New York City, will have an over all length of 338 feet, extreme breadth 76 feet and depth molded to main deck at side of guard 13 feet 8 inches. She will be propelled by a diagonally inclined triple expansion steam engine, steam being supplied by two single and two double-ended Scotch boilers. The steamer is to be furnished complete with the White Fuel Oil Engineering Corporation mechanical fuel oil burning system.

Although first bids were received on October 20, the date of delivery of the new boat was postponed until April 1, 1924, and a second set of prices requested. The tenders submitted were as follows:

	First Bid	*Second Bid*
Federal Shipbuilding Co.	$695,000	$695,000
Bethlehem Shipbuilding Co.	742,140	742,140
Sun Shipbuilding Co.	815,254	815,254
New York S. B. Co.	980,000	959,000
Bath Iron Works	1,030,000	980,000

Contract for Construction of Red "D" Line Ship Awarded to New York Shipbuilding Corp.

THE New York Shipbuilding Corporation has been awarded the contract for the construction of a new passenger and freight ship for the Red "D" Line, bids for which were taken several weeks ago. The vessel will be driven by turbine engines and was designed by Theodore E. Ferris, naval architect and marine engineer, of 30 Church Street, New York City.

The tenders offered contained about 44 proposals, which included prices for the ships equipped with McIntosh & Seymour engines, Busch-Sulzer engines, Burmeister & Wain engines and the Sun-Doxford engines. The types of turbine engines figured on included the De Laval, Parsons, Curtis and Westinghouse makes. In addition to the 44 bids, proposals were made by each shipbuilder to construct one and two ships on the Isherwood system, stating the saving in weight and price.

The ship is to have an overall length of 320 feet and will be of the two-deck shelter deck type driven by twin screws and will be equipped to carry about 50 first class and 25 second class passengers. The vessel will be built to American Bureau Classification. Bids submitted were as follows:

Company	Reciprocating Engines — Price each for — One ship	Two ships	De Laval Turbines — Price each for — One ship	Two ships	McIntosh & Seymour Diesel Engines — Price each for — One ship	Two ships
Federal Shipbuilding Co.	$753,700	$723,700	$789,000	$765,000	$879,000	$849,000
New York Shipbuilding Corp.	740,000	740,000	798,000	798,000	852,500	852,500
Bethlehem Shipbuilding Corp.	781,000	756,000	831,000	811,000	910,000	890,000
Todd Shipyards Corp. (Tacoma Yard)	793,000	754,000	854,000	808,000	922,000	892,500
Newport News Shipbuilding Co.	863,000	829,000	901,000	871,000	959,000	930,000
Merchant Shipbuilding Corp.	889,000	839,000	926,000	874,000	974,000	924,000
Wm. Cramp Sons Ship & Engine Bldg. Co.	906,000	871,000	948,000	912,000	*1,099,000	*1,064,000
Sun Shipbuilding Co.	910,000	870,000	946,000	906,000	986,000	946,000
Bath Iron Works	1,097,000	1,045,500	1,131,000	1,079,500	1,170,000	1,121,000

*Burmeister & Wain engines.

Federal Shipbuilding Company Gets Contract for Construction of Two 262-Foot Diesel Propelled Ships

IT is reported from authentic sources that the Federal Shipbuilding Company, Kearny, N. J., has been awarded the contract for the construction of two Diesel propelled ships for the United States Steel Products Company. The boats will be of the full Welland Canal size and will probably be operated through the canal in the open season and in Southern waters in the winter time. It is understood the total cost will be close to $1,000,000.

The vessels will each be 262 feet over all, length 250 feet on the keel, 43 feet beam and 20 feet deep. They will be equipped with Diesel oil burning engines and electric hoists.

Sun Company to Convert Covedale to Diesel Drive

THE Sun Shipbuilding Company has been awarded the contract for reconditioning the Munson Line steamer *Covedale*. The steam engine in the ship is to be replaced with one 900 brake horsepower, 6-cylinder, 4-cycle McIntosh & Seymour Diesel engine and the auxiliaries are to be electrically driven instead of by steam. A small auxiliary boiler will supply steam for heating purposes, the contract to be completed in about 75 days. It is understood the total cost will be close to $130,000.

Fletcher Yard Lowest Bidder for Resolute

WITH a price of $99,973, the W. A. Fletcher Company, Hoboken, N. J., submitted the lowest bid for the work of reconditioning the steamship *Resolute*, of the United American Line. The tenders were opened November 21, with the following results:

Fletcher	$99,973
Robins	146,200
Tietjen & Lang	149,780
Morse	172,560
Newport News	182,000

Bids Asked for Ten Steel Barges for Rock Island

UNITED States Engineer Office, Rock Island, Ill., will receive bids until 10 A. M., December 11, for the construction and delivery of 10 steel barges. The vessels are to have a length of 100 feet, beam molded 30 feet and depth molded 6 feet. The deck fittings will include four 36-inch cleats, four 7-inch double bitts and four 30-inch open chocks, all of cast steel. The bids are to be delivered afloat at a port on the Mississippi River between Dubuque and Keokuk, Iowa.

Alderton Dry Docks Gives Lowest Price for Liberty Job

THE Alderton Dry Docks Company tendered the lowest bid for the work of repairs to the steamship *Liberty*. Prices were received by the Shipping Board, 45 Broadway, New York, on November 22, as follows:

Alderton	$12,290
N. Y. Harbor	13,653
Staten Island	14,633
Atlantic Basin	17,200
Robins	18,565

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Tide Water Oil Co. Plans Three New Steel Barges

PLANS and specifications have been issued by the Tide Water Oil Company, 11 Broadway, New York City, for the construction of one, two and three steel barges, of the scow type, each having a capacity of 300,000 gallons of bulk oil.

The proposed boats are to have a length, inside fenders, of 162 feet; breadth, inside fenders, 36 feet; depth molded, amidships, 10 feet; draft, molded, 9 feet 6 inches. Each boat will have a continuous steel, watertight bulkhead fitted on the center line for the full length of the oil tanks and there will be five oil tight transverse bulkheads. The hatches are to be fitted in groups of four, one forward and one aft. A deck house, about 16 feet by 12 feet by 7 feet three inches, will be located aft, built of 7½ pound plating. It will be equipped with four galvanized pipe berths, shipmate range, etc., the living quarters to be provided with all necessary fittings.

EQUIPMENT

A three-inch hand force pump of approved make will be fitted in each compartment, with 2-inch bilge suctions.

Cast iron fittings to be supplied include the following: four 9-inch towing bitts; six open chocks; six heavy mooring cleats; two Providence hand power capstans.

There are also to be furnished one 650-pound stockless anchor; 45 fathoms of ¾-inch chain cable; 45 fathoms of ¾-inch wire hawser; one 14-foot wooden workboat.

CARGO PUMP

There is to be one pump, 14 by 10½ by 18 inch horizontal duplex, of approved make, capable of discharging 750 barrels per hour when operating at a piston speed of not over 85 feet per minute with a working steam pressure of 100 pounds per square inch.

HEATER COILS

The coils in each compartment are to consist of a coil or grid about 50 feet long, and a length of pipe in every frame space for full width of compartment.

Engineer Office at Pittsburgh to Have New Dredge

UNITED States Engineer Office, Pittsburgh, Pa., will receive sealed proposals until 12 o'clock noon (Eastern time), December 1, for constructing and delivering one steel dipper dredge hull afloat at Pittsburgh. The hull will have a molded length of 100 feet, molded beam 34 feet, depth forward above base 6 feet 8 inches, depth aft above base 6 feet 8 inches.

After delivery of the hull, the contracting officer will furnish and install all machinery, boiler and stack: dipper, complete with "A" frame; boom and back stays; spuds; all sheaves; planking for top of deckhouse; operator's house and skylight over boiler. The vessel will be built to the rules of the American Bureau of Shipping and the longitudinal system of framing will be used.

One approved syphon, with 2-inch discharge, will be installed in each compartment, the contractor to furnish and install all necessary piping, valves, fittings, etc.

Two Diesel-Electric Drive Ships Proposed for Great Lakes; Lombard Governor Co. Gets Engine Contract

THE Minnesota Atlantic Transit Company, of Duluth, Minn., is contemplating the construction of two Diesel electric drive vessels, according to reports from the Great Lakes district. Henry Penton, of Cleveland, Ohio, is the naval architect preparing plans and specifications.

It is understood that the Lombard Governor Company, of Ashland, Mass., manufacturers of Lombard oil engines (Diesel system), has been awarded the contract for four 6-cylinder 375 horsepower Diesel engines and two 2-cylinder 60 horsepower auxiliary engines for the proposed vessels. Information as to who will build the ships was not obtainable at this time.

French Company Adopts Oil Fuel for Its Ships

THE Compagnie des Messageries Maritimes owns a certain number of oil-burning ships and has decided to make further use of oil as a vessel-fuel, according to information received by the Department of Commerce, Washington, D. C., from the American Consul at Marseilles, France. The ships of this company include the *Lieutenant de Missiessy* and the *Lieutenant de La Tour*,—the former built in England and the latter in America; and a steamboat, the *Angkor*, refitted at La Ciotat in 1921. Another vessel, the *Amazone*, will be refitted in a short time. Two large boats under construction, *Leconte de Lisle* at La Ciotat and the *Aramis* at the shipyard of La Gironde, will be oil-burners; as will all ships built for this company in the future. However, the equipment of the vessels will be so arranged that the substitution of coal may be easily effected in case the price of oil becomes prohibitive.

The Compagnie des Messageries gives the following advantages derived by vessels from the use of oil as fuel: (1) reduction of crews, (2) regularity in power and thus in speed, (3) reduction in expense of boiler maintenance. It is stated that experiments prove that when oil is substituted for coal as fuel on vessels, the boilers give much longer service.

Four Contracts Awarded to the Johnson Works

THE Johnson Iron Works, of New Orleans, La., was awarded the contract for installing Falk gears and overhauling the machinery of the steamship *West Wauna*, new bids for which were recently taken by the United States Shipping Board. The prices submitted were as follows:

Johnson Iron Works	$24,400
Galveston Dry Docks	25,907
Todd D. D. & S. B. Co.	25,969
Jahncke Dry Docks	26,942
Alabama D. D. & S. B. Co.	29,030

The Johnson Works was also the successful bidder for the contract to furnish and install a new shaft on the stern wheel river tug of the Mississippi-Warrior service, at an approximate price of $4,000.

Other awards made to the same company include the work of installing new plates in the turbine and minor repairs to the turbine auxiliaries on the steamship *West Sequoia*; and the making of repairs on the steamship *El Demar*, including the shortening of masts and minor repairs to machinery and piping.

Bids Asked for Building of Three Steel Deck Barges

UNITED STATES Engineer Office, Pittsburgh, will receive sealed proposals until 12 o'clock noon, Eastern Time, November 25, for furnishing and delivering three steel deck barges. The boats are to have a molded length of 120 feet, molded beam 32 feet, molded depth 7 feet, depth of hull at center 7 feet 4 inches.

Each barge is to be symmetrical about the centerline, wall sided, flat bottomed, with rounded bilge, without shear, and deck pitched 4 inches between the centerline and gunwale. There are to be two transverse watertight collision bulkheads, one longitudinal watertight centerline bulkhead and one transverse watertight bulkhead. The deck fittings will include six cast steel watertight hatches, four cast steel towing bitts, four cast steel kevels, not less than 46 inches in length and suitable for a 2-inch rope.

United States Ship Houston Is to Be Converted to Oil

THE Hanlon Shipbuilding and Dry Dock Company, of Oakland, Cal., was low bidder for reconditioning the *U. S. S. Houston*, with a tender of $20,468. The work called for converting the vessel from coal to oil-burning, in addition to other changes, to be completed in 28 days. The following companies submitted bids, which were:

Bethlehem Shipbuilding Co.	$26,638
Los Angeles Shipbuilding Co.	27,359
Main Iron Works	30,088
United Engineering Co.	32,986
General Engineering Co.	36,014
Moore Shipbuilding Co.	40,125

Bids in for S. S. Swiftstar Repairs; Newport News Low

THE Newport News Shipbuilding & Dry Dock Company has been awarded the work of reconditioning the Steamship *Swiftstar*, of the C. D. Mallory Company, tenders for which were opened on November 8.

The bids were as follows:

Newport News	$171,500	60 days
Robins	198,000	75 days
New York Harbor	251,600	80 days
Morse	295,000	80 days
Crane	381,920	90 days

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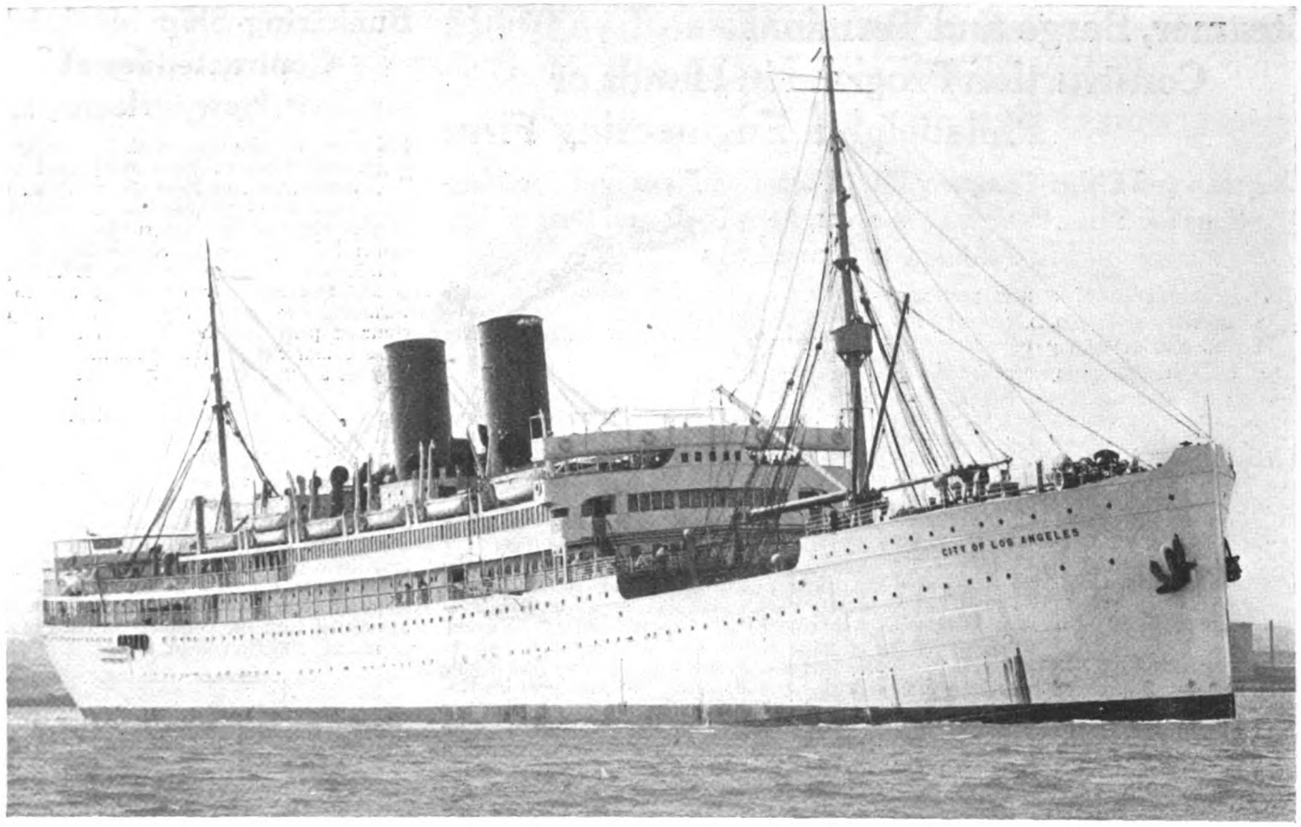

The City of Los Angeles left on her first trip from Los Angeles to Honolulu, September 11th. Upwards of three hundred members of the Los Angeles Chamber of Commerce with their wives and families were on board. The service is to be fortnightly, sailing from Los Angeles and from Honolulu every second Saturday from September 23rd until further notice.

Seven Steel Barges, Two Boilers, Two Turbines, Pumps and Equipment Wanted By War Department, Memphis

THE War Department, Office of the Mississippi River Commission, for the First and Second District, of Memphis, Tenn. (Flood Control, Mississippi River), has issued specifications for the construction of six and seven steel barges and the furnishing of turbines, pumps, feed-water heater, boiler feed pumps, electric light plant and boilers, sealed proposals to be received at the office of the Commission, Customhouse, Memphis, Tenn., until 11 A. M., December 2.

BARGES

Prices are to be submitted for six and seven steel barges, each to have a molded length of 120 feet, beam 30 feet, depth of hold at center 7 feet 4 inches, beam 30 feet, depth of hold at side 7 feet. There are to be four continuous transverse watertight bulkheads, and each barge is to be equipped with ten hatches and two towing bitts at each end.

BOILERS

The work contemplated by the boiler specifications consists of furnishing two horizontal internally fired boilers of the Clyde or dry-back type without steam dome, fitted with Morison corrugated furnace, or equal, grate bars, firebrick-lined combustion chambers, dry pipes and compound separators. Each boiler shall be of 125 horsepower and have not less than 1,250 square feet of heating surface, the furnace not less than 48 inches in diameter, grate surface not less than 28 square feet and flues of not less than 3½ inches in diameter and each provided with a hydrokineter. They are to be designed for a working pressure of 200 pounds per square inch.

It is proposed to erect the boilers side by side on suitable saddles, the saddles to be furnished by the contractor and constructed to conform to the crown of the deck.

TURBINES

Two steam turbines, each direct-connected to a 4-stage centrifugal pump, complete with flexible couplings, shall be furnished and installed, and each turbine and pump shall be mounted on a cast iron base. The steam turbine shall be designed to run condensing in conjunction with one waterworks type surface condenser and air pump of sufficient capacity to handle all the exhaust steam from both turbines. Each steam turbine shall be designed to operate on 150 pounds gage pressure at the throttle, with 26-inch vacuum at the exhaust nozzle, at a speed of not more than 2,000 revolutions per minute.

PUMPS

The pumps shall be the horizontal shaft, 4-stage centrifugal type, adapted to the speed of the turbine, and shall be designed to deliver 750 gallons of water per minute, each, against a pressure shown by suitable gage attached to the discharge nozzle of 225 pounds per square inch. The suction lift will be approximately 10 feet.

CONDENSER

The condenser, designed to be installed in the suction line to the pump, will have not less than 600 square feet of tube surface.

Twelve Contracts for Repairs Go to N. Y. H. Yard

THE contract for repairs to the steamship *Nile* was awarded to the New York Harbor Dry Dock Company, following the opening of bids, November 10, by the Shipping Board, at 45 Broadway. Prices submitted:

New York Harbor	$4,533
Alderton	5,279
Clinton	5,347
Crane	6,439

Tenders were opened by the Board on the same day for repairs to the steamship *Sarcoxie*, which was also awarded the New York Harbor Dry Dock Company on their bid of $1,135.

The steamers *Westport* of the Shipping Board, *Cosmos* of the Ellerman Lines, *Sapanta* of the Standard Transportation Company, oil barge *No.* 5 of the Tidewater Oil Company, *West Gotomska* of the Shipping Board, *Somerset* of the Standard Oil of New Jersey, *Argen* of the Standard Oil of New York, *Castle Lodge* and *Westerner* of the Shipping Board and a sub chaser of Sloan Danenhauer, are also recent contracts awarded the New York Harbor Dry Dock Company and not the Staten Island Shipbuilding Company, as previously reported.

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Steamer, Barge and Terminal Construction Program in Hands of Philadelphia Engineering Firm

Chapman and Fisher Company, Inc., Preparing Plans and Specifications for River Passenger Steamer, Ferryboats and Barges in Addition to Three Piers

THE construction of a new passenger steamer, two ferryboats, several tank barges and rebuilding of other tank barges for Chesapeake Bay service, in addition to the construction of two 700-foot covered piers and a coaling pier, are among the latest propositions on the boards of Chapman & Fisher Company, Inc., consulting engineers and naval architects, 524 Walnut Street, Philadelphia, Pa.

The firm recently opened bids for rebuilding the passenger steamer *New Jersey*, for service on the Delaware River, for the account of the Burlington Island Amusement Company. The prices submitted for the work were $119,500; $177,000; $210,000; $273,000.

New Construction

The new vessel proposed is to be a first-class passenger excursion steamer having a length of 240 feet, 35 feet beam, 60 feet over guards and 12 feet deep. She is to be driven by compound inclined engines. The speed is to be about 14 knots.

The dimensions for the two ferryboats have not yet been determined and probably will not be available for about 60 days. The boats will be for service to Delaware River ports.

With regard to the construction and rebuilding of tank barges, which will be for Chesapeake Bay service, details were not available at this time although plans and specifications are expected to be completed in December.

Pier Work

The Chapman & Fisher Company have also taken over a proposition to engineer and construct a water terminal along the Atlantic Seaboard, probably a South New Jersey port. The plan is to build two 700-foot covered piers for the storage of grain, package freight and bulk oil and also to construct a coaling pier. Considerable dredging and wharf building will be involved in the terminal project. The matter is expected to be in sufficient detail to secure bids on this work early in February and a meeting of the stockholders, controlling the operation, to determine the extent of expenditures, is arranged for late in November.

198 Steel Vessels of 255,431 Gross Tons Under Contract Oct. 1, Increase Shown Over September

ON October 1, 1922, American shipyards were building or under contract to build for private shipowners 198 steel vessels of 255,431 gross tons compared with 131 steel vessels of 249,999 gross tons on September 1, 1922.

These figures do not include Government ships or ships building or contracted for by the United States Shipping Board.

Following is a summary of reports of shipyards to the Bureau of Navigation, Department of Commerce, showing the number and gross tonnage of steel vessels under construction or contract for private owners on October 1, 1922:

Companies.	Number.	Gross tonnage.
American Bridge Co., Ambridge, Pa.	79	36,082
The American Shipbuilding Co., Cleveland, Ohio	7	53,000
Bethlehem Shipbuilding Corp., Ltd.:		
Baltimore Dry Docks Plant, Locust Point, Baltimore, Md.	2	2,020
Harlan Plant, Wilmington, Del.	5	2,736
Sparrows Point Plant, Sparrows Point, Md.	3	17,350
Union Plant, San Francisco, Calif.	2	.....
Charles Ward Engineering Works, Charleston, W. Va.	5	1,400
Consolidated Shipbuilding Corp., Morris Heights, N. Y.	1	300
Dravo Contracting Co., Pittsburgh, Pa.	20	6,690
Dubuque Boat and Boiler Works, Dubuque, Iowa	2	275
Federal Shipbuilding Co., Newark, N. J.	5	18,500
Great Lakes Engineering Works, River Rouge, Mich.	3	16,820
Howard Shipyards Co., Jeffersonville, Ind.	2	995
James Rees & Sons Co., Pittsburgh, Pa.	1	175
Johnson Iron Works, Dry Dock and Shipbuilding Co., New Orleans, La.	2	750
Kyle & Purdy, Inc., City Island, N. Y.	3	810
Los Angeles Shipbuilding and Dry Dock Corp., Los Angeles, Calif.	2	3,500
Marietta Manufacturing Co., Point Pleasant, W. Va.	11	4,050
Nashville Bridge Co., Nashville, Tenn.	3	1,000
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.	3	13,000
New York Shipbuilding Corp., Camden, N. J.	10	30,690
The Pusey & Jones Co., Wilmington, Del.	4	8,300
Riter-Conley Co., Pittsburgh, Pa.	10	9,000
Staten Island Shipbuilding Co., Port Richmond, N. Y.	5	2,738
Sun Shipbuilding Co., Chester, Pa.	3	13,650
Toledo Shipbuilding Co., Toledo, Ohio	1	8,200
Wm. Cramp & Sons Ship and Engine Building Co., Philadelphia, Pa.	3	2,100
Union Construction Co., Oakland, Calif.	1	1,100
Total	198	255,431

Contract Award

The contract for the construction of three steel dump scows, bids for which were opened November 7, by the United States Engineer Office, Buffalo, N. Y., has been awarded the Penn Bridge Company, Beaver Falls, Pa. The company's price was $92,120.

Bunkering Ship Contracted for at New Orleans, La.

IN order to take care of their steadily increasing business, the Consolidated Fuel Company, Inc., of New Orleans, La., has contracted with the Johnson Iron Works, of that city, for the construction of a steel collier hull, 110 feet by 35 feet by 6 feet 6 inches, for delivery early in 1923. The boilers and conveyor machinery are to be furnished and installed by the owner. The contract price for the hull and tower was $25,300 and the total investment will probably be about $50,000. The latest type machinery will be installed in the vessel and she will be able to deliver coal at the rate of 200 tons per hour.

The Consolidated Fuel Company, Inc., was organized in February of this year with Mr. H. E. McCormack, President, R. P. Hyams and H. C. Whiteman, Vice-Presidents, and Charles Harrington, General Manager. Mr. I. B. Whiteman, for many years engaged in the bunkering of ships at New Orleans has recently become associated with the company in the capacity of marine superintendent.

Proposals Asked for Construction of Nine Barges

SEALED proposals will be received at the office of the Mississippi River Commission, Third District, P. O. Box 404, Vicksburg, Miss., until 11 A. M., December 14, for furnishing nine steel barges. Each boat will have a length molded of 120 feet, beam molded 30 feet, depth of hold at center 7 feet 4 inches, depth of hold at side 7 feet.

Each barge shall be of steel construction throughout, flat-bottomed, with rounded knuckles, wall sided, symmetrical about the center line, with a rake 15 feet long, a sheer 12 inches high at each end, and a crown of beam of 4 inches. Transverse framing lines shall be spaced uniformly 30 inches. There shall be four continuous, transverse, watertight bulkheads, one non-watertight longitudinal plate bulkhead over the center line, and two symmetrically disposed longitudinal stiffening trusses.

Bethlehem Buys Simpson's Patent Dry Dock Company

THE Bethlehem Shipbuilding Corporation has purchased the plant of the Simpson's Patent Dry Dock Company, whose main office is located at 23 Ames Building, Boston, Mass. The yard is on Marginal street, East Boston. It was established in 1856.

Three graving docks have been maintained, one 465 feet long, one 250 feet long and one 150 feet long. The company's officers were, Charles F. Crowell, president; Ezra H. Baker, vice-president, and Arthur M. Baker, general manager.

It is announced that the drydock company's yard will be continued in operation as a ship repair plant under the direction of the Fore River branch of the Bethlehem Corporation.

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Bids Taken for Reconditioning of Steamer Valdura

PROPOSALS for the repair of the steamship *Valdura,* which sustained damage as a result of going aground in the Hawaiian Islands, were opened at noon on November 22, at the office of Macfarlane, Garmey & Company, 32 Broadway, New York City. Robins Dry Dock & Repair Company, with a price of $65,650 and 30 days' time, submitted the lowest figure. The bids, which have been submitted to the owners for decision, were as follows:

		Days
Robins	$65,650	30
Tietjen & Lang	69,840	35
Bethlehem	71,700	33
Morse	82,000	35
Newport News	107,400	50
New York Harbor	117,421	60

Steamer Manitowoc Repair Work Goes to Alderton Shipyard

THE contract for repairs to the steamer *Manitowoc,* bids for which were received by the Foreign Transport & Mercantile Corporation, New York, has been awarded the Alderton Dry Docks Company, at a price of $3,797. The tenders were:

Alderton	$3,797
Morse	3,869
Staten Island	4,156
Tietjen & Lang	4,970
Robins	5,125
Fletcher	6,800

Transport Logan Goes to Bethlehem West Coast Yard

THE Bethlehem Shipbuilding Company, of San Francisco, Cal., was low bidder for reconditioning the United States army transport *Logan.* The work called for extensive alterations on the vessel's passenger accommodations and life-saving equipment. Tenders were as follows:

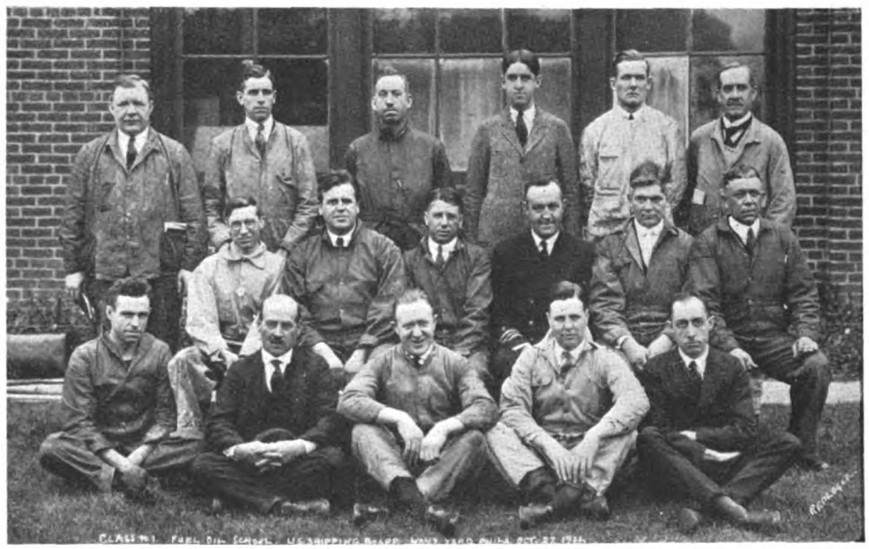
Bethlehem Shipbuilding Co.	$16,989
Moore Shipbuilding Co.	24,527
De Young Company	25,985
Hanlon S. B. & D. D. Co.	28,750

Midland Barge Co. is Lowest Bidder for Derrick Hull

THE Midland Barge Company, of Midland, Pa., with a price of $13,800, was low bidder for the construction of one steel derrick boat hull at the opening of bids by the United States Engineer Office, Pittsburgh, Pa., on November 20. The boat is to have a molded length of 80 feet, molded beam 34 feet and molded depth 5 feet. The bids were as follows:

Midland Barge Co.	$13,800
Independent Bridge Co.	14,300
Pennsylvania Bridge Co.	14,600
Dravo Contracting Co.	16,450
Charles Ward Engineering Works.	16,500
American Bridge Co.	17,000

Shipping Board Graduates Its First Classes in Study of Fuel Oil Burning and Development



Class No. 1, Shipping Board Fuel Oil School.

Top row, left to right: Messrs. Henning, Healey, Phelan, Clavin, Smith, Shoe. Second row: Messrs. Klein, Jefferson, Stevens, Norton, Grace, Cunningham. Front row: Messrs. Hobbs, Sullivan, Peterson, Brierly, Brierly.

THE first class in the Shipping Board's Fuel Oil School, which has been established at the Philadelphia Navy Yard under the general direction of the Navy and Fuel Conservation Committee of the Shipping Board, has completed its course of instruction. All the members of this class were exceedingly enthusiastic over the prospects of success for the school. The Fuel Conservation Committee hopes to further the science of oil burning in the American merchant marine and in that way to contribute to the greater efficiency of our vessels.

As an indication of the interest inspired by this course, the assistant port engineer of one of the large steamship companies states that information given out at the school was immediately put to practical use on one of his steamers.

"I took the opportunity on October 28," he said, "of giving the chief and the first and second assistant engineers a full two hours' instruction covering several important points that were brought out in the course, taking these men inside of one of the boiler furnaces and explaining in detail important points with regard to burner adjustments, refractories, etc.

"You may recall on the steamship *Satartia* (fitted with three B. & W. boilers) that we had the crew rebuild six side walls complete on her last voyage to India, placing the necessary material on board prior to sailing. This work, as you know, was very well done and made a considerable saving in repair bills."

A second class of instruction began on November 7 and was made up of thirteen engineers including representatives from the Munson Line, Moore & McCormack, United States Lines, J. H. Winchester & Company, Kerr Steamship Company and the Mallory Transport Company. The third class began November 20.

Susquehanna Job Goes to Atlantic Basin Iron Works

THE steamship *Susquehanna* was awarded the Atlantic Basin Iron Works for repairs as a result of bids received by the Shipping Board, 45 Broadway, New York, on November 20. The prices submitted were:

Atlantic Basin	$15,290
Morse	18,680
Tietjen & Lang	21,119
New York Harbor	23,840

Shipping Board Offers Four Ships at Public Sale

THE Shipping Board is offering for sale four ships built by the Los Angeles Shipbuilding and Dry Dock Company, namely, the *West Greylock, West Faralon, West Chopeka* and *West Prospect,* of 10,000 deadweight tons each and ranked among the finest of the fleet. The board is holding them for more than $30 a ton each, according to Sidney Henry, director of sales.

BUSINESS NOTES

The committee on docks, piers and wharves, of the National Fire Protection Association, will hold a meeting on Tuesday, December 13, at 9:30 A. M., in the room of the National Board of Fire Underwriters, 67 William Street, New York City. It is expected that this meeting will be the most important meeting of the committee up to this time. Charles H. Fischer is chairman of the committee.

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Marine Construction News of the Month

Ship Contracts — New Ship Concerns and Shipyard Improvements—Terminal Projects—Government Contracts

SHIPS AND SHIPBUILDING

Reconditioning, Norfolk, Va.—The Lake Gallien went to Norfolk to be reconditioned.

Repairs to Steamer, Oakland, Cal.—Steamer La Placencia was placed on ways at Moore Shipyard, Oakland, for repairs.

Admiral Liner Drydocked, West Coast.—Admiral liner Spokane went to Todd Harbor Island plant to be cleaned and painted.

Steamer Repaired, Superior, Wis.—Steamer C. S. Robinson went to Superior to be repaired. Twenty-six plates were replaced.

Vessel Overhauled, San Francisco, Cal.—Pacific Mail Steamship President Cleveland went to Bethlehem plant for overhauling.

Contract Awarded, Hoboken, N. J.—W. & A. Fletcher Company awarded contract for repairs to steamship Fegundo. Price $7,000.

Miscellaneous Repairs, Chester, Pa.—Union Oil Company's tanker Puento went to Sun Shipyards to be drydocked for miscellaneous repairs.

Damaged Steamer Drydocked, Galveston, Tex.—Steamship Saccarappa went to Galveston for repairs to damages sustained in foreign waters.

Shipbuilding, Whitehaven, Md.—The Whitehaven Shipbuilding Company is rebuilding three large schooners and is overhauling seven others.

Cleaning and Painting, San Francisco, Cal.—The Rose Mahony went on Bethlehem Shipbuilding Company's drydock for cleaning and painting.

Steamship Reconditioned, Philadelphia, Pa.—Steamship Tippah, of the Inland Steamship Company, went to a local yard for reconditioning.

Steamer Drydocked, Providence, R. I.—New Bedford steamer Ucatena was hauled out on the East Providence drydock for scraping and painting bottom.

Plates Repaired, Seattle, Wash.—Freighter Ketchikan went to the Todd plant to have plates repaired. Several punctured plates will be replaced.

Tanker Repairs, Chester, Pa.—Tanker Chester Sun, owned by the Sun Oil Company, was drydocked at the Sun shipyard at Chester for repairs.

Contract Awarded, Hoboken, N. J.—W. & A. Fletcher Company was awarded the contract of reconditioning the steamer Eastern Trader. Price $81,000.

Bow Replacement, San Francisco, Cal.—Steamer Sudbury went to Bethlehem Shipbuilding Company, San Francisco, to have several of its bow plates replaced.

Tanker Inspected, San Francisco, Cal.—Shipping Board tanker Hamer went on drydock for inspection prior to being taken over by the General Petroleum Company.

General Repairs to Steamer, New Orleans, La.—New York and Porto Rican Steamship Company's steamship Carib went to Johnson Iron Works for general repairs.

Repairs, San Francisco, Cal.—Mexican steamer Colima and motorship Cycol went to the Barnes & Tibbitts' yards to undergo general overhauling and minor repairs.

Lengthening of Vessel, New Orleans, La.—Ferryboat Ruth went to Johnson Iron Works to be lengthened fifteen feet and to have her guards widened three feet.

Two Steamers to be Reconditioned.—After their next round voyages, the Resolute and Reliance, of the United American Lines, will be withdrawn from service and drydocked to be conditioned for their winter cruises.

Overhauling of Steamer, New Orleans, La.—Johnson Iron Works awarded contract to install Falk gears and overhaul machinery of steamship West Wauna. Price $24,400.

West Coast Activities.—The Bethlehem Shipbuilding Corporation, San Francisco, was awarded the following: Harbor Tug James N. Gilette, steamer Ebian and steamer Mahoe.

Annual Inspection, Seattle, Wash.—Steamship Starr, operating in mail service from Seward, Alaska, westward, will go to Seattle for annual repairs, inspection and overhauling.

Repairs to Barge, Staten Island.—The New York Harbor Dry Dock Company was awarded the contract for repairs to the East Jersey Railroad Company's barge No. 26. Price $6,013.

Oil Barge Launched, New Orleans, La.—Johnson Iron Works recently launched a 5,100-barrel capacity oil barge to be used by the Southern Paper Mills. It is 144 feet long and is of steel.

Ferryboat Launched, San Francisco, Cal.—Steel ferry steamer Shasta was launched at the Union plant of the Bethlehem Shipbuilding Corporation for the account of James Rolph & Company.

New Shaft on Tug, New Orleans, La.—Johnson Iron Works awarded contract to furnish and install new shaft on stern wheel river tug of Mississippi Warrior Service. Approximate price, $4,000.

Repairs to Steamers, Staten Island, N. Y.—New York Harbor Dry Dock Company, Staten Island, was awarded repairs to steamships Nile and Sarcoxie. Prices $4,553 and $1,135, respectively.

Liner to Undergo Reconditioning.—At the conclusion of its next round voyage the George Washington, of the United States Lines, will be withdrawn from service for a month to be reconditioned.

Tug Drydocked, Savannah, Ga.—Tug W. B. Keene, Savannah-New York Transportation Company, went on ways of the Wilkinson Marine Railway & Drydock Company to have new propeller and shaft fitted.

Contract Awarded, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation was awarded the contract to replate the bow of the freighter Walter Luckenbach, damaged in a collision. Price $20,934 and 16 days.

Isonomia Contract, Baltimore, Md.—The latest addition to the Foster Fleet, is the Pacific Freighters Company steamship Isonomia, recently fitted with Foster Waste Heat Type Superheaters, at Baltimore, Md.

Contract Awarded, Hoboken, N. J.—The contract for the conversion of 17 tugs and 5 lighters, of the New York Central Railroad Company, was awarded to Tietjen & Lang plant of the Todd Shipyards Corporation. Approximate expenditure, $250,000.

Conversion to Oil Burner, Newport News, Va.—The Newport News Iron Works, Inc., of Newport News, Va., is completing the contract awarded to them by the E. K. Wood Company, of San Francisco, of converting the Lake Bridge from coal to oil burner.

Possible Reconditioning.—It is reported in marine circles that the steamship Plainfield, of 4,112 deadweight tons, has been sold by the Shipping Board to the Baltimore and Carolina Steamship Company and that there is a strong possibility of the new owners reconditioning the ship.

Westinghouse Reduction Gears, Pittsburgh, Pa.—The Compagnie Generale Transatlantique (French Line), Paris, has ordered from the Westinghouse Electric & Manufacturing Company, East Pittsburgh, six sets of double reduction, floating frame type gears of 6,000 horsepower each.

Award of Contract, Savannah, Ga.—Wilkinson Marine Railway and Drydock Company was awarded the contract of work on Martin's Industry Light Vessel No. 1. Specification called for exterior work on the hull, including scraping and painting below the water line, and refinishing the hull.

Extensive Reconditioning, San Pedro, Cal.—The Lake type Shipping Board freighter Cowiche, purchased on the East Coast several months ago by the California and Oregon Lumber Company, went to the plant of the Los Angeles Shipbuilding and Dry Dock Corporation to undergo extensive reconditioning.

Contracts Awarded, New Orleans, La.—The following were awarded to the Jahncke Dry Dock Company: Tanker Anomia, to be refitted and have stern post straightened; steamship West Jaffrey, minor repairs; steamer Nacata, to undergo extensive repairs; Shipping Board steamship Lafcomo, repairs.

Bethlehem Yard Activities, San Francisco, Cal.—The Bethlehem Shipbuilding Company was awarded the following repair jobs, including cleaning and painting: Steamers Lurline, Carlos and C. A. Smith, barkentine Echo, schooner Alumna, steam schooner Katherine, motorship Oronite and barge Erskine M. Phelps.

Bunkering Ship, New Orleans, La.—Consolidated Fuel Company, New Orleans, awarded contract to Johnson Iron Works for construction of steel collier hull, 110 feet by 35 feet by 6 feet 6 inches, for delivery in 1923; boilers and conveyer machinery to be furnished by owner. Contract price for hull and tower, $25,300.

Contract Awarded, Camden, N. J.—The contract for the construction of a new passenger and freight ship for the Red "D" Line was awarded to the New York Shipbuilding Corporation; ship to have overall length of 320 feet, driven by twin screws and equipped to carry about 50 first class and 25 second class passengers.

Extensive Repairs, Bremerton, Wash.—The steamship Empress of Australia was awarded to Todd Dry Docks Company, Seattle, for extensive reconditioning. The company deemed it advisable to do the work at the United States navy yard's graving dock instead of attempting to lift the big ship in the Seattle floating dock.

Miscellaneous Contracts, New Orleans, La.—Following contracts awarded Johnson Iron Works: work of installing new plates in turbine and minor repairs to turbine auxiliaries on steamship West Sequoia; and making of repairs on steamship El Demar, including shortening of masts and minor repairs to machinery and piping.

Construction of Two Ships, Kearny, N. J.—Federal Shipbuilding Company was awarded contract for construction of two Diesel propelled ships for United States Steel Products Company. Boats will be 262 feet over all, length 250 feet keel, 43 feet beam and 20 feet deep, ships to be equipped with Diesel oil engines and electric hoists.

Steamers Change Ownership, Norfolk, Va.—A trade has been made between the Buxton Line and the Norfolk and Mobjack Bay Steamboat Company by which the former acquired the steamer Ocracoke, formerly owned by the Old Dominion Steamship Company, and the latter, the steamship Sieur De Monts, purchased recently by the Buxton Line from the army.

Contracts for Oil Burners, New York.—Standard Transportation Company, New York, installed in one of their tugs a complete installation of Peabody-Fisher wide range oil burners. The Western Union Cable Company placed a contract for the removal of oil burning system in the cable steamer Lord Kelvin and installation of Peabody-Fisher wide range burners.

Vessel Repairs, Staten Island, N. Y.—The following vessels were awarded to the New York Harbor Dry Dock Company for repairs: Westport, of the Shipping Board; Cosmos, Ellerman Lines; subchaser Sloan Damenhauer; Sapanta, Standard

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Transportation Company; oil barge No. 5, Tidewater Oil Company; West Gotomska, Shipping Board; Somerset, Standard Oil of New Jersey; Argen, Standard Oil of New York; Castle Lodge and Westerner, Shipping Board.

Steel Electric Cable Ship, New York.—Bids will be received until December 4 by J. W. Millard & Brother, naval architects, 17 State Street, New York City, for construction and outfitting and delivery of a steel twin screw, Diesel electric, cable laying vessel for the Western Union Telegraph Company; length from fore side of stern to after side of stern post on 16-foot waterline, 211 feet; breadth molded 34 feet; depth molded to upper deck, 18 feet 6 inches.

New Passenger and Freight Steamer, Seattle, Wash.—The Todd Shipyards Corporation was awarded a contract to build a twin screw combination passenger and freight steamer for the Alaska Steamship Company. The vessel will have a length of 350 feet between perpendiculars, 47 feet 6 inches beam, draft of 20 feet, speed about 16 knots, cargo capacity 2,500 tons, accommodations for 235 passengers and will burn oil fuel with Todd mechanical burners.

GOVERNMENT WORK

Dredging, Norfolk, Va.—U. S. Engineer plans dredging in Appomatox River.

Dredging, New York, N. Y.—U. S. Engineer, 2nd District, plans dredging in Raritan River.

Steel Hull, Huntington, W. Va.—U. S. Engineer plans to purchase steel hull for quarter-boat.

Maneuver Boat, Huntington, West Virginia.—U. S. Engineer plans to purchase maneuver boat for Dam 30.

Dredging, Puget Sound.—Specification 4708.—Bureau of Yards & Docks, Navy Department, Washington, D. C., rejected bids for dredging Puget Sound.

Piers, Pearl Harbor.—Specification 4687.—Bureau of Yards and Docks, Navy Department, Washington, D. C., will soon receive bids for two 335-foot reinforced- concrete piers, 18 feet wide, including dredging and filling.

SHIPYARDS AND DRY DOCKS

Dry Dock Plant Purchased, Boston, Mass.—The Bethlehem Shipbuilding Corporation has purchased the plant of the Simpson's Patent Dry Dock Company, whose main office is located at 23 Ames Building, Boston, Mass. The yard is on Marginal street, East Boston. It was established in 1856.

Three graving docks have been maintained, one 465 feet long, one 250 feet long and one 150 feet long. The company's officers were: Charles F. Crowell, president; Ezra H. Baker, vice-president, and Arthur M. Baker, general manager. The yard will be operated as a ship repair plant under the direction of the Fore River branch of the Bethlehem Corporation.

Firms Consolidate, Boston, Mass.—The engine and ship repair business and good will of the Bertelsen & Petersen Company, of East Boston, has been purchased by the Atlantic Works of East Boston. Jens Bertelsen is to become vice-president of the Atlantic Works, and Paul Bertelsen will be works manager, both becoming stockholders and directors by the new arrangement. Such machinery as can be used to advantage in the Atlantic Works will be removed and the balance of the Bertelsen & Petersen plant will be closed out. The Atlantic Works will put in a large floating drydock of some 10,000 tons capacity. The company already has three marine railways.

PORT IMPROVEMENTS

Pier, Montreal, Que.—Sterling Construction Company, Montreal, Canada, was awarded a contract by Montreal Harbor Commissioners for 300-foot extension to Jacques Cartier Pier. Price $150,000.

Wharf, Montreal, Que.—Harbor Commissioners awarded a contract to Barrett-McQueen, Ltd., 373 Canada Cement Building, to build 500 foot concrete extension to Imperial Oil Wharf, Longue Pointe. Price $200,000.

Contract Placed, Norfolk, Va.—Another unit was added to the Norfolk municipal terminal development project when the City Council, by a unanimous vote, recently authorized the awarding of a contract to the Raymond Concrete Pile Company for construction of a 1,200 foot pier, 494 feet wide, at a new municipal grain elevator. The cost will be $680,000.

Although the bond issue of $5,000,000 voted by the city at a special election in February included not only a grain elevator, but also separate additional projects—marginal wharves, a pier and warehouses—it was decided to hold up the latter two of these three developments temporarily, because of the likelihood that the city would obtain a long-term lease on the Army Base warehouses and piers. So a contract was awarded A. M. Crain & Company for construction of the elevator, at a cost of $639,000 and a later contract was entered into with the Raymond Concrete Pile Company for construction of the marginal wharves and jetties.

Grain Elevator, Baltimore, Md.—The Pennsylvania Railroad completed and had in full operation by November 15 the $5,500,000 grain elevator it had had under construction for some months. This addition to the company's waterfront facilities of Baltimore, Md., increases its grain handling capacity to 4,250,000 bushels. The enlargement has a capacity of 1,300,000 bushels of grain in bins, the structure being of iron and concrete fireproof construction, driven throughout by electric power. Its location is on deep water where ships to 35-foot draft can enter, four ships to be loaded at one time. The hourly capacity for loading vessels is 120,000 bushels, a part of the equipment being four mechanical unloading machines which release automatically the grain door of the box cars loaded with grain. These unloading machines have an hourly capacity of 40 cars or 80,000 bushels of grain.

NEW INCORPORATIONS

Fidello Navigation Corporation, $50,000, chartered in Delaware.

Winton Navigation Corporation, $50,000, chartered in Delaware.

Hunter Navigation Corporation, $50,000, chartered in Delaware.

Charles R. McCormick Steamship Company, capital $1,500,000 incorporated at Sacramento, Cal.

The Philadelphia and Norfolk Steamship Company, capital $1,500,000, chartered under Delaware laws.

The International Steamship Company, of New York, capital $100,000, chartered under Delaware laws.

Maritime Trust Company, capital $1,000,000, divided into 1,000 shares of $100 par value and a paid-in surplus of $1,000,000; New York.

Trans-American Trading Company, of Manhattan, capital $50,000, chartered at Albany. Incorporators: R. M. Gardner, O. G. A. Hogstedt and E. T. Nappin.

Kismet Navigation Corporation, of New York, capital $50,000, chartered under Delaware laws. Incorporators: William R. Greenway, Maurice V. Geneh and W. V. Sullivan, of New York.

Coastal Steamship Corporation, of Manhattan, capital $150,000, incorporated at Albany. Incorporators: J. W. Cunningham, C. E. Goodhue and C. H. Hunter. Lampke & Stern, attorneys, 29 Broadway, New York.

F. L. Zimmerman & Company, Ltd., of Manhattan, capital $50,000, chartered at Albany, to do a ship chartering business. Incorporators: F. L. and T. E. Zimmerman and L. F. Schworm. Lampke & Steinof, 29 Broadway, attorneys.

The Delanco Construction Company, of Delanco, N. J., capital $100,000, chartered at Trenton, to do a shipbuilding business. Incorporators: Louis D. Steele, Jacob P. Schmidt, of Delanco; Ridgway Spotts, of Edgewater Park, and Norman J. Calhoun, of Camden.

The Great Northern Steamship Company, capital $500,000, of which 9,000 shares are preferred 9 per cent cumulative stock and 10,000 shares are common stock of the par value of $50, incorporated under laws of Massachusetts as a transatlantic steamship company. Incorporators: Robert E. Tucker, Ernest W. Tucker and Perley A. Hale, all of Troy, N. H.; Norman D. Tucker and Earl E. Howard, of Fitchburg, Mass.; Fred O. Howard and Edna Howard, of Boston, and Florence S. Howard, of Gardner, Mass.

FOREIGN ACTIVITIES

Port Construction, Spain.—A company has been formed in Lisbon for the purpose of constructing a port on the Peninsula on Montijo, on the opposite side of the River Tagus, to Lisbon.

Order Placed, Scotland.—Messrs. Alexander Stephen & Son, Linthouse, have secured an order for the construction of a new steamer for the Clyde Shipping Company, Glasgow. The new ship will be 250 feet long, of 1,560 tons gross and the propelling machinery will be triple expansion engines.

Clyde Shipbuilding Output, Scotland.—In October the Clyde shipyards launched half a dozen vessels of 53,670 tons—the third largest monthly total for the year. The record for the ten months consists of 107 vessels of 342,888 tons, which is less than that of the corresponding period of last year by 88 vessels of 63,107 tons, and than the highest figures on record—those of 1913—by 111 vessels of 216,946 tons.

New Liner, New Zealand.—Union Steamship Company of New Zealand is planning the immediate construction of a 600-foot Diesel liner to be operated under the British flag between British Columbia and the Antipodes. She will be the largest vessel in the Pacific Coast-Australian trade and the first Diesel passenger carrier on the Pacific. Negotiations for building the vessel are being made with a Glasgow shipbuilder.

Tanker Launched, France.—A motor-driven tanker built for the Societe Generale des Huiles de Petrole was recently launched at Mantigues (Bouches du Rhone). The vessel, intended for carriage of petrol and mazout between Marseilles and Mediterranean ports, is fitted with six tanks having a total capacity of about 600 tons. Propelling machinery consists of a semi-Diesel motor of 200 horsepower, giving a speed of 6½ knots fully loaded.

New Vessel, England.—Representatives of the Cunard Line in New York received word of the successful launching of the latest addition to the company's fleet, the Franconia. The ship, replacing one of the same name, possesses many new features for comfort and convenience of passengers. She is 620 feet long, 74 feet in breadth and 45 feet deep, and she has a gross tonnage of 20,000, average sea speed 16 knots. The vessel accommodates 330 first, 420 second and 1,000 third class passengers.

Successful Trials, Germany.—The Tonganjika, new Hamburg-American Line steamer, built by Messrs. Blohm & Voss, Hamburg, has completed successful trials. The ship, which has been built for the West African trade, left Hamburg on October 15 for her maiden voyage. She is 448 feet in length, 58 feet in breadth by 26 feet in depth and has a gross hold capacity of 8,537 tons. Accommodation is provided for 100 first class passengers, 80 second class and 100 steerage. The propelling machinery consists of four steam turbines, developing 3,700 indicated horsepower and giving a speed of 12 knots.

Ore Carrier Launched, Sweden.—The motor ore-carrier Luossa was recently launched from the yard of Gotaverken, Gothenburg, and is one of a number of such vessels which are under construction for the Grangesberg-Oxelosund Company. She is 385 feet in length, with a beam of 53 feet 5 inches and a molded depth of 34 feet and the deadweight capacity is 8,200 tons on 25 feet draught. The propelling machinery consists of two Burmeister and Wain type six-cylinder Diesel engines, each of 1,300 indicated horsepower. On the day she was launched a sister-ship, the Lulea, also built by Gotaverken, ran her trials.

Trial Trip, Montrose, Scotland.—The single screw cargo steamer S. S. No. 93, built by the London & Montrose Shipbuilding & Repairing Company, Ltd., for Messrs. Llewellyn, Merrett & Price, Ltd., of Cardiff, ran her official trials successfully; the speed obtained being a knot and a half in excess of the contract. She is of the raised quarter deck type with engines placed aft and is designed to carry 1,050 tons of cargo. The vessel was constructed for the owners' special trade.

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Norris R. Sibley Goes to London Steam Turbine Co.

NORRIS R. SIBLEY, who has been in charge of the Westinghouse Electric & Manufacturing Company's marine department in New York for several years, has resigned to become New York district manager for the London Steam Turbine Company of Troy, N. Y.

Mr. Sibley has served as assistant and chief engineer in several of the lines of the

Norris R. Sibley

merchant marine, including the American Line (International Merchant Marine Company), Clyde Line, Mallory Line, Southern Pacific Company (Morgan Line), Panama Line (Panama Railroad), Lukenback Line, Benvenue Granite Company, and Metropolitan Dredging Company. For a time he covered the marine field for the *New York World*, the *New York Herald*, and the *Sun* Press Bureau and assisted in compiling "The Blue Book of Facts," a book on marine engineering.

After leaving the United States Army Transport Service in 1918, Mr. Sibley became connected with the Westinghouse Electric & Manufacturing Company. He served as guarantee engineer on the steamship *Westwood*, and the steamship *Agawam*, the first fabricated ship in the world. He was also the Westinghouse representative at the plant of the Submarine Boat Corporation, where he supervised the installation of propelling equipment on vessels built at those yards.

He is an alumnus of the Massachusetts Nautical School, a member of the National Marine League, and various marine engineering associations. Mr. Sibley's long experience in the steam turbine field well qualifies him for his new work. His office will be in New York City.

TRADE PUBLICATIONS

CONCENTRATION SALINITY INDICATORS.—The elimination of salt from boiler feed water, particularly in the case of the modern watertube boiler with its high steaming capacity, led to the development of an electrical device by Leeds & Northrup Company, Philadelphia, Pa., in co-operation with the Babcock & Wilcox Company, New York, for determining the degree of salinity in boiler feed water. This instrument is also used for the accurate measurement of the salinity of condensates, distillates, evaporator brine and the like. Complete details are given in a booklet which was distributed at the Marine Exposition.

MONEL METAL IN SERVICE AT SEA.—For a number of years before the recent war the United States Navy had been developing applications of Monel metal and had in many instances substituted it for other metals previously thought best under destructive forces. A few of the larger marine equipment manufacturers worked along similar lines. It has gradually been adopted to use in an almost endless variety of marine applications. A description of the metal and its many uses aboard ship are described in a pamphlet issued by the International Nickel Company, New York.

THE MANUFACTURE OF CONDENSER TUBES.—In a booklet issued by the Chase Metal Works, Waterbury, Conn., complete details of the manufacture of condenser tubes are given, starting with a general outline of the three processes of producing tubes; the piercing process, the cupping process and the cast shell method. The properties and specifications and the causes of condenser tube failures are given, as well as the results of the study of factors controlling grain size of Admiralty tubes. The remainder of the booklet includes details of the physical requirements of the tubes, the method of test and inspection, as well as the use and care of condenser tubes in service.

FOSTER WASTE HEAT TYPE SUPERHEATERS.—Superheaters of the waste type for marine boilers have been installed in the ships of all nations. Details of such installations with complete descriptions of the superheaters are given in a bulletin issued by the Power Specialty Company, of New York. Thermometers and soot blowing apparatus with suitable safety valves for the superheaters are included. Operating records of superheaters on various ships and a list of ships equipped with Foster superheaters with their principal machinery details are also stated. Concluding sections give tabulated data on the properties of steam, fuel oil, steam pipe capacities and the like.

DURALOY.—Bulletin No. 221, of the Cutler Steel Company, Pittsburgh, Pa., contains a general description of the metal Duraloy, which has properties of resistance to oxidation, corrosion and abrasion. Duraloy is a chromium iron alloy developed as a low cost alloy to resist oxidation. It can be supplied in castings, bars, sheets and in rolled form responds to heat treatment in a manner similar to alloy steels. The pamphlet outlines the machining qualities, welding qualities and the resistance of this metal to heat, corrosion and the like.

MARINE SOCIETIES

AMERICA

American Society of Naval Engineers
Navy Department, Washington, D. C.
Secretary-Treasurer—Commander S. M. Robinson, U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.

Society of Naval Architects and Marine Engineers
29 West 39th Street, New York.
Secretary and Treasurer—Daniel H. Cox.

National Association of Engine and Boat Manufacturers
29 West 39th Street, New York City.
Secretary—R. R. A. Hand.

United States Naval Institute
Naval Academy, Annapolis, Md.
Secretary and Treasurer—Commander H. K. Hewitt, U. S. N.

American Marine Association
15 Park Row, New York
President—E. A. Simmons.
Secretary—Robert B. Lea.

The New York Tow Boat Exchange
11 Moore St., New York.
Secretary—Irving G. Keller.

Port of New York Authority
11 Broadway, New York.
Chairman—E. H. Outerbridge.
Secretary—William Leary.

Marine Engineers' Supply Men's Association
Room 507, 30 Church Street, New York.
Secretary—Robert P. Jones.

National Association of Masters, Mates and Pilots
National Secretary—M. D. Tenniswood, 308 Vine St., Camden, N. J.

American Society of Marine Designers
Secretary—B. G. Barnes, 202 Kendrick Ave., Quincy, Mass

National Marine Engineers' Beneficial Association
Headquarters 311-315 Machinists Building, Washington, D. C.
Secretary-Treasurer—George A. Grubb.

Atlantic Coast Shipbuilders' Association
1701 Walnut Street, Philadelphia, Pa.
Secretary—C. S. King.

American Steamship Owners' Association
11 Broadway, New York
President—H. H. Raymond.
Vice-President and General Manager—Winthrop L. Marvin.

United States Ship Operators' Association
149 Broadway, New York
President—C. H. Potter

National Merchant Marine Association
Munsey Bldg., Washington, D. C.
President—Hon. J. E. Ransdell.

The Maritime Association of the Port of New York
78 Broad St., New York City
President—Charles H. Potter.
Secretary—Walter F. Firth.

Lake Carriers' Association
Detroit, Mich.
Secretary—George A. Marr.

Neptune Association
21 Pearl St., New York City
Secretary-Treasurer—Captain John F. Milliken

Ocean Association of Marine Engineers
15 Whitehall St., New York City
Secretary—Bert L. Todd.

CANADA

Grand Council N. A. of M. E. of Canada
Grand Secretary-Treasurer—Neil J. Morrison, Box 886, St. John, N. B.

GREAT BRITAIN

Institution of Naval Architects
5 Adelphi Terrace, London, W. C.

Institution of Engineers and Shipbuilders in Scotland
39 Elmbank Crescent, Glasgow.

Northeast Coast Institution of Engineers and Shipbuilders
Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

Institute of Marine Engineers, Incorporated
The Minories, Tower Hill, London.

ITALY

Collegio Degli Ingegneri Naval e Meccanici in Italia

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